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# AIR COMMAND AND STAFF COLLEGE

## STUDENT REPORT

CONSOLIDATION OF ATC AND TAC  
MISSILE MAINTENANCE OFFICER COURSES

MAJOR HATLEY N. HARRISON, III 84-1170  
*"insights into tomorrow"*

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## PREFACE

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The author devoted the last three years (1980-1983) to help establish a maintenance training program for the Ground Launched Cruise Missile (GLCM) Weapon System. The primary focus of this endeavor was to gain the capability to train enlisted technicians to properly maintain the GLCM weapon system so the Air Force could successfully meet its initial operational capability deadlines. Little emphasis was placed on the training of GLCM maintenance officers. Although the need was recognized, there simply wasn't the time or resources to adequately develop a training program for GLCM maintenance officers, especially those without any prior maintenance experience.

However, during the last two years, members of the Tactical Air Command staff have suggested that a proper way to train GLCM maintenance officers is to emphasize maintenance management and its application instead of a more hardware oriented approach. Further, they propose that this might best be done by a universal course which teaches management principles to all missile maintenance officers regardless of command of assignment or missile system.

In 1984, TAC must decide how they will instruct new missile maintenance officers entering the GLCM system. They want Air Training Command to develop and teach a universal course, one which would also teach Strategic Air Command missile maintenance officers. Is this in SAC's best interest? Should we indeed combine missile maintenance officer training into one universal course?

This is the question the author seeks to answer in this paper. Time was not available to the author to investigate this problem until his assignment to Air Command and Staff College. Also, the author's student status, while not eliminating all bias, does provide a more balanced environment in which to attempt a fair analysis of the universal training proposal.

This paper is specifically for readers with a background in Minuteman missile maintenance and training. Its purpose, in addition to answering the question "Should we adopt a universal missile maintenance training program?", is to cause training decision makers to think about what they are really trying to accomplish in their maintenance training programs and then compare that with an objective view of what their existing programs really offer.

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Without the unselfish assistance of many persons in SAC, TAC, ATC and USAFE, this paper could never have been completed. The author wishes to thank for their generous support Captain Jim Johnson, HQ TAC/LGWLG; Captain Jim Davidson, AFMPC/MPCROS7A; Captain Paul Curtis, 868 TMTS/TTS; and Captain Mike Moffit, HQ TAC/DOTP. Major Jim O'Brien, HQ SAC/LGBA offered first-rate assistance in providing the SAC point of view and bringing the author up-to-date in SAC missile maintenance. Also, Mr. Charles Krause of the Aircraft Maintenance Officer Course (AMOC) at Chanute AFB, Illinois provided invaluable assistance in explaining the AMOC program and providing the latest course control documents. Finally, a special thanks to my former boss, Major Dave Ramagos for keeping me so well informed on the latest happenings in TAC and the GLCM system.

## ABOUT THE AUTHOR

Major Harrison is a career missile maintenance officer with 13 years experience in line and staff missile maintenance functions spanning both ICBM and tactical missile systems. He initially served as a combat targeting officer in the Minuteman weapon system at the 341st Strategic Missile Wing, Malmstrom AFB, Montana. Following this assignment he was an instructor at Chanute AFB, Illinois for three and one-half years teaching all facets of the Minuteman missile maintenance officer curriculum. From Chanute he provided logistics support for Strategic Air Command's Minuteman Follow-On Test and Evaluation Programs at Vandenberg AFB, California, serving in the 394th Test Maintenance Squadron and the First Strategic Aerospace Division. In 1980 Major Harrison joined the Tactical Air Command staff to develop the maintenance training program for the Ground Launched Cruise Missile (GLCM) weapon system. He was the first logistics officer and a charter member of the 868th Tactical Missile Training Squadron (TMTS) at Davis-Monthan AFB, Arizona, whose mission was to provide all initial operations and maintenance training for the GLCM weapon system.

Major Harrison holds a Bachelors Degree in Geology from Louisiana State University and a Masters of Business Degree from Southern Illinois University. He is a distinguished graduate of Squadron Officer School in residence as well as a graduate of Air Command and Staff College.



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## EXECUTIVE SUMMARY

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REPORT NUMBER 84-1170

AUTHOR(S) MAJOR HATLEY N. HARRISON, III, USAF

TITLE CONSOLIDATION OF ATC AND TAC MISSILE MAINTENANCE OFFICER COURSES

I. Purpose: To determine if entry level missile maintenance officer courses conducted by Air Training Command (ATC) and Tactical Air Command (TAC) for the Minuteman, Ground Launched Cruise Missile (GLCM) and Peacekeeper weapon systems should be consolidated into a universal missile maintenance officer course.

II. Problem: In late 1979 the Strategic Air Command (SAC) was no longer the sole operating command using missile maintenance officers (AFSC 31XX). At this time the Tactical Air Forces (TAF) began using the 31XX resources to acquire and maintain the new GLCM weapon system. Tactical Air Command is responsible for developing a training program for new 31XX accessions into the GLCM system. Rather than teach a GLCM-unique course, TAC has proposed that a universal missile maintenance course be taught by ATC which would be attended by all 31XXs regardless of their command or weapon system assignment. Such a universal course would emphasize maintenance management principles and their application to a much greater extent than is now done. This universal course is but a concept now and has not been "fleshed out" into specifics (i.e., number of training hours, exact curriculum, and resources needed). Should the Air Force pursue this proposal?

III. Data: Because the universal missile maintenance officer course is a concept and does not exist in fact, it cannot be objectively

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compared to existing curricula. Rather an evaluation of the proposal must be accomplished by analyzing the opportunities it may be able to take advantage of. Also, the universal course is but one alternative. It must be compared with other reasonable alternatives if a valid decision is to be reached. Other missile maintenance officer training alternatives include: maintaining the status-quo (i.e., ignoring the training of GLCM maintenance officers); having ATC and TAC teach their separate courses; and having ATC teach all weapons systems similar to the way it currently teaches the Minuteman weapon system (a heavy hardware orientation). An environment of opportunity in which all possible training alternatives must operate was established and served as criteria with which to measure the value of each training alternative. A decision matrix approach was used to model the comparison of each training alternative to the environment to allow the reader to more easily critique the author's bias and form his (the reader's) own opinions. First, an opportunity to change current training programs exists because both SAC and the TAF desire more management emphasis in their missile maintenance office training programs. Yet, current ATC training programs and a proposed program by TAC fail to do this. Both courses emphasize weapon system hardware over maintenance management by 3 to 1. Secondly, an opportunity to combine courses exists since duties of 31XXs in both SAC and the TAF are very similar. The organizational structure of Minuteman and GLCM maintenance organizations are very close right down to the branch level and the maintenance regulations of both commands are virtually identical. A further opportunity to combine courses exists because 31XXs will be shared between SAC and the TAF. There is a projected overseas imbalance in GLCM 31XX positions versus CONUS positions which defines at least a 20 percent probability of a career missile maintenance officer serving one GLCM tour. Fourth, an opportunity to save money may exist by combining training programs although the savings will likely be small. Combining training programs won't reduce overhead costs since at each ATC or TAC training site, other enlisted training courses would still require the facilities and equipment that the officer training programs now share with them. Combining training programs may reduce personnel costs (travel, per diem and instructor salaries) by reducing the number of training events (an officer attends one course instead of two). However, an analysis of cost saving opportunities is rather speculative until a universal course is more clearly defined. Finally, a broad opportunity to improve the quality of missile maintenance programs exists when they are compared to successful training programs in other

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related maintenance officer career fields. The aircraft maintenance career field (40XX) is a career field very similar to the 31XX career field. Air Force Manual 36-1, Officer Classification Regulation shows the two career fields to be the same as far as broad officership duties and responsibilities are concerned. The Aircraft Maintenance Officer Course (AMOC) taught by ATC at Chanute AFB, Illinois is a universal course for aircraft maintenance officers serving in all aircraft weapons systems and MAJCOMs. Compared to missile maintenance officer courses, this program emphasizes maintenance management subjects and their application over weapon system hardware subjects by 3 to 1, the exact opposite approach of current missile maintenance programs. Also, the AMOC curricula teaches maintenance management subjects to a higher level of performance than do the missile maintenance programs.

IV. Conclusions: Compared to the other three training alternatives, the universal missile maintenance officer course alternative appears to best meet the environment of opportunity. Its sole intent is to place heavy emphasis on maintenance management and the application of maintenance management principles--an emphasis which all MAJCOMs want but are not really getting now. It more fully accounts for the new sharing of missile maintenance officers and best recognizes how similar their management tasks are regardless of MAJCOM or weapon system of assignment. Better than any other alternative, the universal proposal shows promise of using the combined experience of instructors in many weapons systems to gain a synergistic quality of instruction not generated in other alternative training programs. The results should be a quantum leap in the quality of missile maintenance officer instruction, and more importantly, job performance. Depending on how the universal course is designed, it also holds promise of saving money or at least being implemented at an acceptable cost.

v. Recommendations: Implement the universal missile maintenance officer course. Place heavy emphasis on application of logistics and maintenance management principles. Emphasize weapon system hardware only enough to allow the thorough application of management principles. Concentrate on graduating "manager/leaders" rather than "technicians/supervisors." Above all, guard against merely combining missile maintenance officer training programs to give the facade of a universal curriculum. The universal curriculum, if properly implemented, will demand the best, most experienced instructors from SAC, TAC and USAFE to make it viable. The AMOC provides a fine

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model which the missile maintenance training community can use to begin this task.

## Chapter One

### INTRODUCTION AND OVERVIEW

The purpose of this research paper is to answer the question "Should entry level missile maintenance officer courses conducted by Air Training Command (ATC) and Tactical Air Command (TAC) for the Minuteman, Ground Launched Cruise Missile (GLCM) and Peacekeeper (MX) weapon systems be consolidated into a generic or universal missile maintenance officer course?"

Chapter One provides the status of each of these weapon systems and their missile maintenance officer training programs as of fall, 1983. It explains why combining missile maintenance officer training was proposed, shows the evolution of the proposal, and who proposed it.

With this background, Chapter Two explains the basic approach to answering the question of combining missile maintenance officer courses. Because a universal missile maintenance officer course did not exist at the time the research was conducted, Chapter Two introduces four training alternatives, including the alternative of a universal course and shows how they will be compared against an environment of opportunities to determine the most desirable training alternative. This chapter also defines broad assumptions and limitations of the research effort.

Chapter Three establishes in detail five criteria which determine the environment in which any missile maintenance officer course will be taught.

Chapter Four examines the four training alternatives and compares them against the environment using a decision matrix model.

Chapter Five presents a summary of findings and recommendations concerning adoption of a generic missile maintenance officer course.

Before addressing whether the Air Force should combine missile maintenance officer courses, a short review of each weapon system using the missile maintenance officer career field (Air Force Specialty Code (AFSC) 31XX) is appropriate as well as



a synopsis of current ATC and TAC training programs. A brief explanation of how the question of combining courses was raised rounds out the introduction and prepares the reader for the research analysis.

### WEAPON SYSTEMS STATUS

Four missile weapon systems use the missile maintenance officer resource: Minuteman (AFSC 31XXG), Titan (AFSC 31XXF), GLCM (AFSC 31XXC) and Peacekeeper (AFSC 31XXZ). Strategic Air Command is dismantling the Titan weapon system due to the age of the system and its perceived unreliability after the Damascus, Arkansas accident. Phase out of Titan began in October 1982 and deactivation should be completed in 1987. (2:6; 4:159) As Titan began its retirement, a new missile system was born. In December 1979 the NATO ministers decided to deploy the GLCM weapon system to counter the Soviet SS-20 missile buildup in Western Russia. (1) With this, SAC was no longer the prime operational command with exclusive rights to AFSC 31XX missile maintenance officers. Ground Launched Cruise Missile full scale engineering development began, and the Air Force Military Personnel Center assigned missile maintenance officers from SAC units to begin deployment of GLCM in the Tactical Air Forces (TAF) starting in 1983.

While the GLCM weapon system pressed on, the Peacekeeper (Missile X) weapon system floundered for lack of a basing mode. Finally, on 19 April 1983 President Reagan decided to base 100 Peacekeepers in existing Minuteman launchers at Francis E. Warren Air Force Base, Wyoming. (3:18) Deployment starts in 1986 and should be completed by 1989. (16:I-27)

With Titan phasing down, GLCM preparing for deployment and Peacekeeper gaining an acceptable basing mode, the Minuteman weapon system remained constant throughout the late 1970s and early 1980s. Thus as this paper is written, we have two prime operational commands using missile maintenance officers, SAC and United States Air Forces Europe (USAFE which is part of the TAF). Strategic Air Command has one system retiring (Titan), one deploying (Peacekeeper) and one without change (Minuteman). United States Air Forces Europe, of course, operates the GLCM weapon system. With this brief overview of the weapon systems, a synopsis of missile maintenance officer training programs follows.

### CURRENT AND PROPOSED TRAINING PROGRAMS

Because the Air Force is deactivating the Titan weapon system, ATC stopped training missile maintenance officers at

Sheppard Air Force Base, Texas, in January 1984. (32:--)  
Thus, this paper will not discuss Titan training as it cannot be a candidate program for a universal course.

Air Training Command personnel at Chanute Air Force Base, Illinois, conduct two entry level courses for Minuteman missile maintenance officers, the C30BR3121G 005 basic course of 14 weeks duration and the C30BR3121G 006 accelerated course of 12 weeks duration. (17:3-61) The basic course is for officers with no prior missile officer experience, and the accelerated course is tailored for those officers with missile operations experience who cross-train into the missile maintenance career field. Other cross-trainees from other nonmissile fields may also attend this course. This paper will analyze both of these courses in detail later.

In addition to conducting Minuteman maintenance officer training, ATC may also conduct portions of Peacekeeper maintenance officer training. (32:--)  
According to HQ SAC/LGBA, there will be no increase in maintenance officers to support the Peacekeeper program. (21) Peacekeeper will have little impact on formal training conducted at Chanute AFB as most officers will simply learn the weapon system while on-the-job. A most likely course of events seems to the author to be a hardware orientation provided somewhere in the two Minuteman missile maintenance officer courses offered by ATC for those officers going to Francis E. Warren AFB. This theory is also shared by the Minuteman missile maintenance officer course supervisor at Chanute. (31:--)

Instead of having ATC conduct GLCM weapon system maintenance officer training, the 868 Tactical Missile Training Squadron (TMTS) at Davis-Monthan AFB, Arizona, will perform this task, at least through 1984. The 868 TMTS is a TAC unit. As of November 1983, the only maintenance officer course offered is TAC GLCM 3116 OOC USAF GLCM Missile Maintenance Staff Course. (12) The curriculum is designed to familiarize experienced missile maintenance officers and senior NCOs with the GLCM weapon system. The 868 TMTS also proposes to teach an entry level maintenance course, TAC GLCM 3121 GLCM Maintenance Officer Course, starting in the spring of 1984. (30:1)

Each of these courses will also be analyzed in detail in Chapter Three. With this thumbnail sketch of current and proposed missile maintenance officer training programs, attention now focuses on who proposed to combine missile maintenance officer training programs and why. The next section of Chapter One also traces the evolution of the proposal and defines the universal missile maintenance officer course.

## THE PROPOSAL TO COMBINE TRAINING

Headquarters Tactical Air Command first proposed combining missile maintenance officer training programs. Lt Col David R. Vick of Headquarters TAC, Systems Management Organization GLCM (HQ TAC/SMOG), informally proposed combining missile maintenance courses in the summer-fall timeframe of 1981. Colonel Vick is an officer with both SAC and TAC missile maintenance experience and has aircraft maintenance experience. He felt the Aircraft Maintenance Officer Course (AMOC) offered at Chanute AFB provided a more meaningful maintenance management program for officers than the missile side. The AMOC instruction covered virtually all aircraft types and commands (i.e., it was universal).

Headquarters Tactical Air Command, Tactical Missile Systems Branch Chief, Captain James A. Davidson, who was responsible for starting both GLCM technician and officer training programs for the TAF, quickly accelerated Lt Colonel Vick's idea by formally introducing it into GLCM TAF/ATC training meetings.

During the 22-25 February 1982 GLCM Training Planning Conference held at Randolph AFB, Texas, Captain Davidson discussed the desire of the TAF to have a "generic" course to teach basic management concepts to all missile maintenance officers. (22:5) The basic course would then be followed by specific weapons systems training to produce a more well-rounded maintenance officer. (22:5)

Minutes of the 3-4 August 1982 GLCM Maintenance Training Conference held at the 868 TMTS reflect Captain Davidson planned to present a formal proposal to consolidate all missile maintenance officer training to SAC at the Minuteman Fall 1982 Training Conference. (26:5)

Then on 1-2 November 1982 at another TAF/ATC GLCM Training meeting, Captain Davidson briefed his formal proposal to combine TAF and SAC training and proposed a Course Training Standard which he and Captain James S. Johnson of the 868 TMTS prepared. (28:2) His proposed universal course emphasizes missile maintenance management principles and their application to create a more well-rounded missile maintenance officer. (28:A7) According to Captain Davidson, such a universal course eases crossflow between commands as officers would only take the basic course once. (28:A7) Further, the one course could accommodate new weapons systems (such as MX) and should save money as opposed to having training at two or three separate locations. (28:A7) To understand more clearly the subject matter proposed by Captains Davidson and Johnson, a copy of the proposed universal training program Course Training Standard is at Appendix A. Unfortunately, no syllabus was prepared

to allow inspection of each of the subject areas according to hours of instruction.

On 15-19 November 1982, Captain Davidson briefed the SAC training managers at the Minuteman Training Conference. (27:1) Based on this briefing, the subject of consolidating training was deferred to a conference between HQ USAF, TAC, SAC, USAFE and ATC to discuss possible implementation. (27:1)

Finally, on 21-23 June 1983 at the Missile Personnel Training Classification Utilization Conference at Randolph AFB, Texas, the proposal to combine training was brought up but was once again deferred until the next conference in mid-February 1984. (24:5) At this time all MAJCOMs were to consider their requirements and present their proposals for officer training either as a common course or courses developed along weapon system lines. (24:5)

Thus a generic missile maintenance course proposal has been in TAC/ATC channels for two years and will find its first public forum before the entire missile maintenance community (including Air Staff) in February 1984. The proposal is in its infancy; it is a broad concept which emphasizes management over weapon system hardware, but does not yet completely specify the degree.

The task of this research paper is to examine missile maintenance officer training offered by ATC and proposed by TAC to see if the Air Force should combine these training programs into a universal course such as proposed by Captains Davidson and Johnson. The decision to combine courses, in the author's opinion, will likely be a joint SAC, TAF and ATC decision, perhaps with Air Staff guidance. This paper will bring all players to a common knowledge level (especially on GLCM training) and facilitate discussion and decision making. Chapter Two outlines the procedure the paper will use to answer the question "Should we combine missile maintenance officer training programs?"

## Chapter Two

### APPROACH OF THE STUDY

In order to answer the question of whether to combine missile maintenance officer courses, this paper will do two things. First, it will define the environment in which any training program will exist, not just a universal course. And because such a universal course does not exist, the paper must express that environment in terms of opportunities. Secondly, the paper will compare four basic training alternatives, including the universal alternative, to the environment to determine which training course fits best. A generic or universal missile maintenance course must fit the environment of the missile maintenance career field better than all other alternatives; otherwise, it won't be considered by all MAJCOMs much less implemented. So what is the environment in which missile maintenance officer training finds itself?

### THE ENVIRONMENT OF OPPORTUNITIES

Certainly, from the discussion in Chapter One, the missile maintenance career field has expanded in terms of weapon systems. Titan is being phased out and Peacekeeper is being deployed. The entirely new dimension is GLCM which is used solely by TAC and USAFE. Thus the environment is bi-polar, between SAC and the TAF.

This bi-polar environment can be defined more precisely by addressing these questions:

- What are the MAJCOM training desires for the 31XX career field? Are they being met now? (i.e., does an opportuniy for change exist?)
- Are duties and responsibilities of missile maintenance officers in SAC and the TAF similar? (i.e., is there an opportunity to combine training programs?)
- Can resources be saved? (i.e., is there an opportunity to save money?)

- Will missile maintenance officers be shared between SAC and the TAF? (i.e., is there an opportunity to combine training programs? Note that should there be no opportunity to share, there might not be a reason for combining courses.)
- Can the quality of training be increased if training is combined? (i.e., is there an opportunity to increase the quality of instruction?)

The paper answers these questions and uses the answers as environmental criteria to measure four training alternatives. These alternatives are presented next.

### THE TRAINING ALTERNATIVES

While the main thrust of this paper is to decide whether to adopt a universal course, it must do this by also considering the other major missile maintenance training alternatives. While there can be infinite variations, the author believes there are basically four missile maintenance training alternatives available.

The first alternative, as in most nearly every human situation, is to do nothing--maintain the status-quo. This would mean that Chanute Technical Training Center would continue its programs for Minuteman missile maintenance training. Officers going into the Peacekeeper weapon system would attend Minuteman training at Chanute and learn Peacekeeper on-the-job (as designed, Peacekeeper will fit into Minuteman silos). The TAF would have no formal training program for GLCM, except for the current staff familiarization course at the 868 TMTS, and the TAF would continue to rely on receiving experienced personnel from SAC.

A second training alternative has ATC teaching SAC Minuteman and Peacekeeper training at Chanute AFB and TAC conducting GLCM maintenance officer training for the TAF at Davis-Monthan AFB. The 868 TMTS would offer its proposed TAC GLCM 3121C, GLCM Maintenance Officer Course as well as the maintenance staff course now in being. (30:1)

A third training alternative would have ATC adding both GLCM and Peacekeeper weapon system hardware orientation blocks to its current Minuteman curriculum. Under this scenario the Minuteman curriculum and instructor cadre would be basically unchanged except to add GLCM and Peacekeeper weapon system orientation blocks. The course flow might look like this:

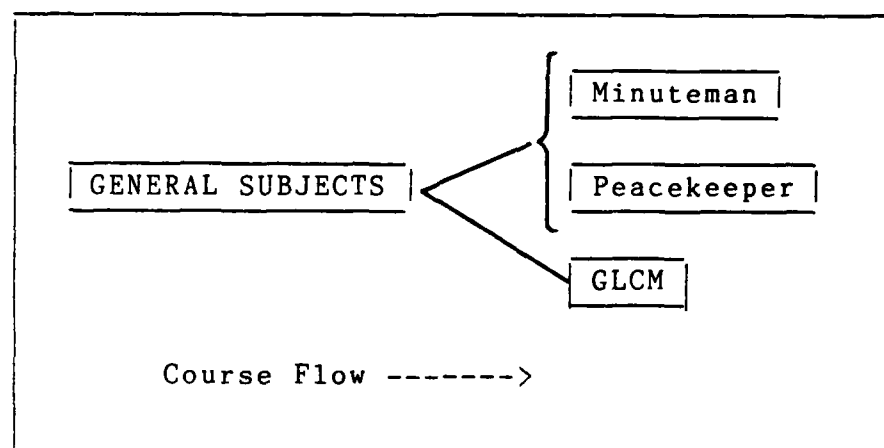


FIGURE 2-1. Maintenance Training Alternative Three

This gives appearances of a universal training course but it is not. The student specializes in the hardware of only one system, the one to which he will be assigned. Minuteman and Peacekeeper appear together simply because the author feels that since Peacekeeper will depend upon major Minuteman operational ground equipment (OGE) in the launcher, most Peacekeeper students will have to essentially master the Minuteman weapon system to achieve confidence in the Peacekeeper system.

The fourth and last alternative which will be considered is the universal maintenance officer course proposed by Captains Davidson and Johnson. The author's interpretation is that this course would give a general overview of each weapon system (in terms of hardware) only detailed enough to permit the student to gain confidence in learning the maintenance management aspects of his profession. Detailed training on the hardware would come at the unit of assignment, most likely as a result of the officer's own efforts. The course would emphasize maintenance management and its practical application.

Thus the four alternatives for missile maintenance officer training can be summarized this way:

<u>Maintain the Status-Quo</u>	<ul style="list-style-type: none"> <li>• Chanutte teaches Minuteman</li> <li>• F. E. Warren teaches Peacekeeper to Chanutte graduates</li> <li>• GLCM gets experienced officers from SAC; 868 TMTS gives a quick orientation and sends to USAFE</li> </ul>
<u>ATC and TAC teach separate courses</u>	<ul style="list-style-type: none"> <li>• Chanutte teaches Minuteman and adds a block for Peacekeeper</li> <li>• 868 TMTS teaches staff orientation and proposed entry level course to new officers</li> </ul>
<u>ATC teaches all systems in manner similar to Minuteman Program</u>	<ul style="list-style-type: none"> <li>• Basically hardware oriented</li> <li>• Student goes through only those blocks of instruction appropriate to his weapon system</li> </ul>
<u>ATC teaches a universal or generic course</u>	<ul style="list-style-type: none"> <li>• Management orientation vs weapon system</li> <li>• Applicable to all commands</li> </ul>

FIGURE 2-2. The Missile Maintenance Training Alternatives

The question now is, "How will one know which alternative is best?"

#### THE TEST FOR COMPLETION

In Chapter Four, the author will compare these four training alternatives with the environmental criteria using a decision matrix. Once the study establishes the environment in which missile maintenance officer training alternatives must compete, each environmental criteria will be weighted and given



a numerical standard relative to its importance. The numerical standard reflects the author's opinion, based on the study. The decision matrix approach, however, will allow the reader to more easily critique the author's bias and form his (the reader's) own opinions.

Figure 2-3 shows the environmental criteria and how they may be ranked.

• MAJCOM Training Desires	
• Similarity of 31XX Duties	
• Money Savings	Each rank ordered
• Sharing of 31XXs Among Weapon Systems	(5 most important; 1 least important)
• Opportunity to Boost Quality of Training	

FIGURE 2-3. Environmental Criteria

Once the criteria are rank ordered, the paper will compare each alternative to the criteria and measure how well it meets each criteria according to the scale shown below:

<u>SCALE</u>	<u>NUMERICAL VALUE</u>
Does Not Fit	0.5
Partially Fits	1.0
Fits	1.5
Exceeds	2.0
Far Exceeds	2.5

FIGURE 2-4. Scale to Measure Training Alternatives

The author chose this scale and its numerical increments with the purpose of more clearly expressing how well a particular alternative matched with the environment in which it operated. The author chose to start the lower end of the numerical scale with 0.5 instead of zero because zero would give an impression of "no value." It would be speculative to conclude that just because an alternative does not fit the environment it has no value. Rather, it has less value than other alternatives. That is the whole purpose of the model--to show relative positions of value among the alternatives presented.

Once the comparison is made of alternatives to criteria, each alternative will be scored by the summation of its ability to meet the ranked environmental criteria. The training alternative with the highest score should be adopted.

Before investigating the environment in which training occurs, the limitations and assumptions which constrain this study must be stated.

#### ASSUMPTIONS AND LIMITATIONS

The author fully expects that the data base (current course control documents) used in this study will change, especially for the new weapon systems coming on line such as GLCM and MX. However, the data presented should show major trends in training emphasis. In order for these training trends (emphasis) to change in the future, the data base must change drastically in a way that will be very obvious to training managers.

A key assumption made in this paper is that the opinions of MAJCOM Offices of Prime Responsibility (OPRs) reflect those of the mainstream of missile maintenance managers. A detailed survey of missile maintenance managers throughout the Air Force is beyond the scope of this paper, but such a survey could be useful as part of the Instructional Systems Development (ISD) process for changes to training programs.

This paper is not an ISD project, however. It might serve as an impetus for "Task Analysis" which is Step One of the ISD process should the MAJCOMs agree to combine missile maintenance office training.

Finally, before beginning the analysis, it's important to keep in mind that a universal course doesn't exist, rather it's a proposal. As such it can't be measured objectively. To work around this limitation, the paper deals with opportunities that may be realized by such a program. Actual implementation will in large degree determine the true effectiveness of a universal course.

## Chapter Three

### THE ENVIRONMENT OF OPPORTUNITY

The paper now establishes the environment in which missile maintenance officer training is conducted by asking these five questions:

- What are the MAJCOM training desires for the 31XX career field? Are these desires being met now?
- Are the duties and responsibilities of missile maintenance officers in SAC and the TAF similar?
- Will missile maintenance officers be shared between SAC and the TAF?
- Can resources be saved by combining current programs?
- Can the quality of training be increased if training programs are combined?

By answering these questions, training opportunities can also be evaluated. For instance, if MAJCOM training desires are not being met now, then an opportunity for modifying our current programs exists. Also, if all 31XX duties and responsibilities in both SAC and the TAF are similar, then an opportunity to combine missile maintenance training exists (certainly, if the duties are not similar then combined training might be unwise). Similarly, if 31XXs will be shared between SAC and the TAF, another opportunity for combining training programs might exist (again, if the 31XXs in SAC and the TAF would never cross commands, there might not be a reason to combine training courses). Each of the above proposals must also be evaluated in terms of resources--is there an opportunity to save money by combining training programs? Most training managers would probably adopt new, more effective training programs if they did not cost any more than those currently in progress. Finally, the opportunity for quality improvement should be examined. What can be done to improve existing courses?

What this chapter will do then, is to answer each of the five questions with the purpose of defining the opportunities

for change, for combining training programs, for saving money and for improving the quality of training programs. By doing this the environment of training opportunity will be defined.

The answers to each of the five questions can serve as weighted criteria for evaluating the four missile maintenance training program alternatives.

### THE MAJCOM TRAINING DESIRES

What are the MAJCOM training desires for the 31XX missile maintenance officer career field? Are these desires being met by current training programs? To answer these questions, the author simply asked them to each MAJCOM (SAC, TAC and USAFE) OPR for missile maintenance officer training to get a broad feel for where their command stood. The essence of the question asked was this: what should the broad thrust of missile maintenance officer training be in your command? A follow up question asked how each OPR felt the current training program was accomplishing the perceived MAJCOM desires. To more completely answer how well each training programs met the training expectations of the MAJCOMs, the author analyzed each entry level missile maintenance officer training program conducted or proposed by ATC and TAC to see if they were indeed meeting the MAJCOM perceptions. What follows is first a synopsis of MAJCOM broad training desires and an analysis of how well they're being met.

#### Tactical Air Forces (TAF) Desires

The broad thrust of missile maintenance officer training according to TAF OPRs should be towards emphasis on maintenance management and application of maintenance management principles over emphasis on the hardware aspects of the system. The TAC position on missile maintenance officer training is abundantly clear and well documented as shown in Chapter One of this paper. Tactical Air Command has proposed the universal missile maintenance officer course and pushed for its implementation as seen in a variety of ATC/TAF Training Meetings, a Minuteman Training Conference meeting, and a Missile Personnel Training Classification Utilization Conference. (22:5; 26:5; 28:2; 28:A7; 27:1; 24:5) As of 26 October 1983 the TAC position is to have a "generic" (i.e., universal) missile maintenance officer course taught at Chanute AFB, Illinois, with GLCM hardware training in the European theatre. (20) The 868 TMTS would not be involved in any missile maintenance officer training. (20)

The TAC position is echoed by the real user of GLCM missile maintenance officers, USAFE. The USAFE Deputy Director for

Ground Launched Missile Maintenance explains quite clearly what the USAFE position is and why:

. . . [USAFE] support[s] a combined basic maintenance officer training course [a universal course], with a follow-on weapon system unique course. This is the only way we can ever effectively employ lieutenants. Based on the unit officer structure, a Lt must come directly into the unit in a responsible management position. If we are going to keep them in the service (i.e., not "eat our young"), they must be better trained before they get there. Management for officers in missiles, across the board, is far more important than technical system unique knowledge. However, "management" covers the entire spectrum of maintenance officer knowledge. Quality assurance, scheduling techniques, UCMJ, OER/APRs, the OJT program, supply discipline, and base budgeting (CACRLs, TAs, etc.) are the types of subjects they should be exposed to. From this course, they could go to a GLCM unique hardware and management course. (29)

All missile maintenance staffs at TAC and USAFE have senior company grade and field grade officers with SAC missile experience, primarily in the Minuteman weapon system. Their perception is that missile maintenance officers in GLCM (and other weapon systems) require a solid background in management and its application, especially since maintenance staffs at unit level are austere. The current TAF drive to implement a universal missile maintenance officer training curriculum covering topics in the ways described by the USAFE Deputy Director for Ground Launched Missile Maintenance shows that they do not feel that new missile maintenance officers are as qualified to manage maintenance as they could be.

#### Strategic Air Command (SAC) Desires

The SAC position on missile maintenance officer training is less aggressively defined as that of the TAF. Even with the Peacekeeper missile, SAC is not fielding a new weapon system such as the TAF is which requires as much additional manpower and has completely new hardware spanning the entire weapons system. So the motivation to change training programs is not as pressing for SAC as it is for the TAF. The HQ SAC/LGBA OPR states that current training programs for the Minuteman weapon system are getting the job done. (34:--) In other words, there are no glaring deficiencies documented which show the programs should be changed. However, the SAC/LGBA OPR felt that while ATC missile maintenance officer training is basically accomplishing the SAC mission, training could be improved by emphasizing logistics principles and relationships over

weapon system hardware. (34:--) He received the TAC proposal for a universal course and, while not completely indorsing the TAC proposal, states:

While . . . a Universal Missile Maintenance Officer Course will be an excellent improvement, [SAC] priority lies with revision of [ATC] 31XX courses now being taught [more management emphasis]. It appears . . . [TAC's] ideas fall near our own for course improvement . . . (21)

One reason for SAC/LGBA interest in emphasizing maintenance management in ATC training programs is a 1983 SAC Management Engineering Team (SACMET) study of how Minuteman Organizational Missile Maintenance Squadrons (OMMS) used AFSC 3124G lieutenants. A HQ SAC/XPME study did not support the requirement for company grade missile maintenance officers in the numbers currently authorized in OMMS and proposed aligning junior officers to positions which permits the officers to gain technical knowledge of on-site maintenance, gain management experience and conserve manpower. (25) The manpower study deleted six company grade officer positions, four in OMMS, one in the Field Missile Maintenance Squadron (FMMS) and one in the Wing Maintenance Support Division's Maintenance Data Branch. (21:A1) Thus, of the 19 company grade missile maintenance officers within a typical Minuteman Wing, six were deleted, a 32 percent decrease in junior officer manning. (33:--) The loss of these junior officer slots, according to HQ SAC/LGBA, reduces the opportunity for SAC to "grow its own" maintenance officers and accents the need to have new maintenance officers who have maintenance management savvy from technical training. (33:--` In other words, there's more work to do with less resources and junior officers must pull more of the maintenance management load. Training emphasis on management is a way to accomplish this.

Both the TAF and SAC appear to be in basic agreement. They desire more maintenance management subjects and application of maintenance principles be included in technical training curricula. Both MAJCOMs also perceive that the current courses are not producing this management oriented training program. The next section investigates exactly how much emphasis current (and proposed) missile maintenance officer courses give to weapon system hardware subjects, maintenance management subjects and application of maintenance management principles.

#### ARE MAJCOM TRAINING DESIRES BEING MET?

Do TAC and ATC entry level missile maintenance officer courses meet SAC and TAF training expectations? The author

analyzed three missile maintenance officer curricula (two from ATC and one from TAC) to see what percentage (based on hours) each course devoted to:

- weapon system subjects
- observation of or participation in maintenance tasks
- maintenance management subjects
- application of maintenance management principles
- other training

Each criterion objective for each course was categorized as fitting into one of the above areas.

"Weapon system subjects" comprise those criterion objectives which stress a knowledge or skill concerning weapon system hardware. Scientific theories and principles of electricity, functions of support equipment, operating concepts, and procedures for maintenance tasks are examples of some objective topics that are categorized under "weapon system subjects."

"Observation of or participation in maintenance tasks" is a category similar to "weapon system subjects." It involves students watching maintenance being performed in a training environment or actually simulating the performance of maintenance under instructor supervision. Based on instructor guidance in both ATC and TAC course control documents, this training appears to emphasize the functions of hardware of each weapon system. (30; 31) In the author's opinion, "observation of or participation in maintenance tasks" is an adjunct of the "weapon system subjects" category. However, since so many criterion objectives are listed this way in ATC course control documents, the author included this as a separate category.

"Maintenance management subjects" entails knowledge of such subjects as maintenance concepts, publications, safety, maintenance personnel duties and responsibilities, organizational function, and supply, to name a few. In contrast, "application of maintenance management principles" entails a student performing to solve a maintenance management problem. He might, for example, prepare a maintenance schedule, give a standup briefing, prepare a financial plan or properly document maintenance forms.

"Other training" simply categorizes such diverse training as COMSEC, OPSEC, orientation, graduation, USAF Graduation Evaluation Program and guided discussion periods.

Appendix B contains the worksheets the author used to analyze each missile maintenance course of instruction. These worksheets represent a complete summary of each course, as all training objectives are recorded and catalogued by Plan of Instruction (POI) or Syllabus reference, level of knowledge and Course Training Standard reference. Appendix A (page 74) contains an Air Force Standard Proficiency Code Key which defines task knowledge and performance levels and subject knowledge levels for reference when reviewing the course analysis worksheets.

#### ATC Missile Maintenance Officer Courses Analysis

Air Training Command teaches two entry level missile maintenance officer courses, C30BR3121G 005 Missile Maintenance Officer, WS-133 [Basic] of 14 weeks duration and C30BR3121G 006, Missile Maintenance Officer, WS-133 (Accelerated) of 12 weeks duration. Both courses are the same except the basic course (005) has a 76 hour block of instruction entitled "Block I--Introduction to Missile Maintenance." (5) This block covers Minuteman weapon system fundamentals, administrative publications, nuclear and missile safety, and COMSEC and OPSEC. (5) It is designed for the new second lieutenant in training for his first Air Force assignment as a missile maintenance officer. The accelerated course (006) starts off with the second block called "Block II--Basic Electronic/Security Access Systems Maintenance." (5) This course is for new missile maintenance officers who have prior Air Force experience usually in Minuteman missile operations (18XX career field).

An analysis of the basic course (005) showed the results in Figure 3-1:



BASIC CATEGORY OF TRAINING	NUMBER OF HOURS	AVERAGE TRAINING LEVEL	PERCENT OF COURSE
1. Weapon System Subjects	155	B	30
2. Observation of or Participation in Maintenance Tasks	207	1b	42
3. Maintenance Management Subjects	99	B	20
4. Application of Maintenance Management Principles	24	2b	5
5. Other	13	A-B	3
TOTALS	498*	---	100
Reference: CTS C30BR3121G 005 (tentative) 18 Nov 83 POI C30BR3121G 005 11 March 83  Remarks: *technical training--does not include testing or military training hours			

FIGURE 3-1. Analysis of Course 30BR3121G 005, Missile Maintenance Officer WS-133

Note that only one-quarter of the course treats maintenance management subjects, while nearly three-quarters of this course covers weapon system subjects. The average training level for knowledge is "B" (can relate basic facts and state general principles) and for skill is "1b" for performing maintenance

tasks (extremely limited) and "2b" for applying maintenance management principles (partially proficient).

Results for the accelerated course (006) are similar as shown in Figure 3-2:

BASIC CATEGORY OF TRAINING	NUMBER OF HOURS	AVERAGE TRAINING LEVEL	PERCENT OF COURSE
1. Weapon System Subjects	128	B	30
2. Observation of or Partic- ipation in Maintenance Tasks	207	1b	48
3. Maintenance Management Subjects	64	B	15
4. Application of Mainte- nance Man- agement Principles	24	2b	6
5. Other	5	A-B	1
TOTALS	428*	---	100
Reference: CTS C30BR3121G 006 (tentative) 18 Nov 82 POI C30BR3121G 005/006 11 March 83			
Remarks: *technical training--does not include testing or military training hours			

FIGURE 3-2. Analysis of Course 30BR3121G 006, Missile Maintenance Officer WS-133 (accelerated)

Here, again, more than three-quarters of the course is devoted to weapon system subjects while maintenance management subjects and applied maintenance management garner a little less than one-fourth the curriculum. A conclusion can be drawn from these two ATC entry level Minuteman missile maintenance officer courses that they do not meet the SAC perception for greater emphasis on management subjects. The ATC curricula are strongly structured to a weapon system hardware orientation. How then do the proposed GLCM missile maintenance officer courses compare, given that TAC is pushing for a universal curriculum--one heavily maintenance management oriented?

#### TAC Missile Maintenance Officer Courses Analysis

As described in Chapter One, the 868th Tactical Missile Training Squadron (TMTS) is TAC's training center for all GLCM initial operations and maintenance training. The 868 TMTS proposed a GLCM Maintenance Officer Course (GMOC) in fall 1983 to provide adequate training for new accession officers entering GLCM maintenance squadrons. (30:1) According to the 868 TMTS curriculum manager, the proposed GMOC is expected to serve about ten officer students per year. (18) The course hasn't been approved for implementation by HQ TAC, and probably won't be approved until the generic or universal course proposal has been evaluated by the entire missile maintenance community. (20) Even though it hasn't been approved, an analysis of this course is needed to get an idea on where TAC course planners are headed. The analysis of the proposed GMOC (TAC GLCM 3121C) follows and provides some interesting results:

BASIC CATEGORY OF TRAINING	NUMBER OF HOURS	AVERAGE TRAINING LEVEL	PERCENT OF COURSE
1. Weapon System Subjects	45.5	A-B	22
2. Observation of or Participation in Maintenance Tasks	102	B	48
3. Maintenance Management Subjects	45	B	22
4. Application of Maintenance Management Principles	6	B	3
5. Other	10.5	B	5
TOTALS	209	---	100
Reference: CTS TAC GLCM 3121C 1 Sep 83 (draft) Course Outline GLCM 3121C 1 Sep 83 (draft)			

FIGURE 3-3. Analysis of Course TAC GLCM 3121C, GLCM Maintenance Officer (proposed)

The TAC GMOC appears to follow the same pattern as the ATC courses. Just under three-quarters (70%) of the curricula deal with GLCM weapon system subjects, and only one-fourth the training covers management topics and applies maintenance management principles. This is somewhat surprising given that HQ TAC is pushing a universal course emphasizing maintenance management. In addition to similar emphasis as a percentage of instruction, the average training levels for each category closely parallel those of the ATC Minuteman courses.

In summary, neither ATC nor 868 TMTS entry level missile maintenance officer courses appear to completely meet SAC or TAF perceived desires for missile maintenance officer training. All courses give low emphasis on applying maintenance management (3-6%) and instead emphasize the weapon system and observing/performing maintenance tasks (70-78%). Thus there is an opportunity for changing current and proposed maintenance officer training programs because none appear to meet SAC or TAF stated expectations.

The paper now addresses the second environmental question, "Are the duties and responsibilities of missile maintenance officers in SAC and the TAF similar?"

#### DUTIES AND RESPONSIBILITIES OF SAC AND TAF MISSILE MAINTENANCE OFFICERS

Are the duties and responsibilities of TAF missile maintenance officers (GLCM weapon system) similar to those of SAC missile maintenance officers (Minuteman and soon, Peacekeeper)? Since both commands use officers who are categorized as AFSC 31XX according to AFR 36-1, Officer Classification Regulation, it would seem that maintenance officers in both commands should have similar duties. (15) But are their duties similar enough to warrant having a combined training program such as the proposed universal maintenance officer course?

Since the Minuteman and Peacekeeper weapons systems belong to SAC, and the GLCM weapon system to the TAF, a useful way to help answer this question is to compare missile maintenance organizational structures at wing level for each MAJCOM user (SAC and USAFE). By also using SACR 66-12, ICBM Maintenance Management, and USAFER 66-14, GLCM Maintenance Management (Draft) to highlight key duties and responsibilities of each officer slot in the wing maintenance organization, the reader without GLCM maintenance experience can better understand the similarity of maintenance officer duties between the two MAJCOMs.

Figure 3-4 shows the organizational structure and maintenance officer manning for a typical SAC wing maintenance complex. (33:--; 10:Vol VI, A2-1, A3-1) Figure 3-5 shows the organization of the GLCM wing maintenance complex in a similar fashion. (13; 14:Figure 1-1)

This section will not regurgitate the duties and responsibilities of the officer positions in the SAC Minuteman missile maintenance organization. (The author assumes the reader already has extensive SAC missile maintenance experience.) This section will highlight any major differences in the duties and

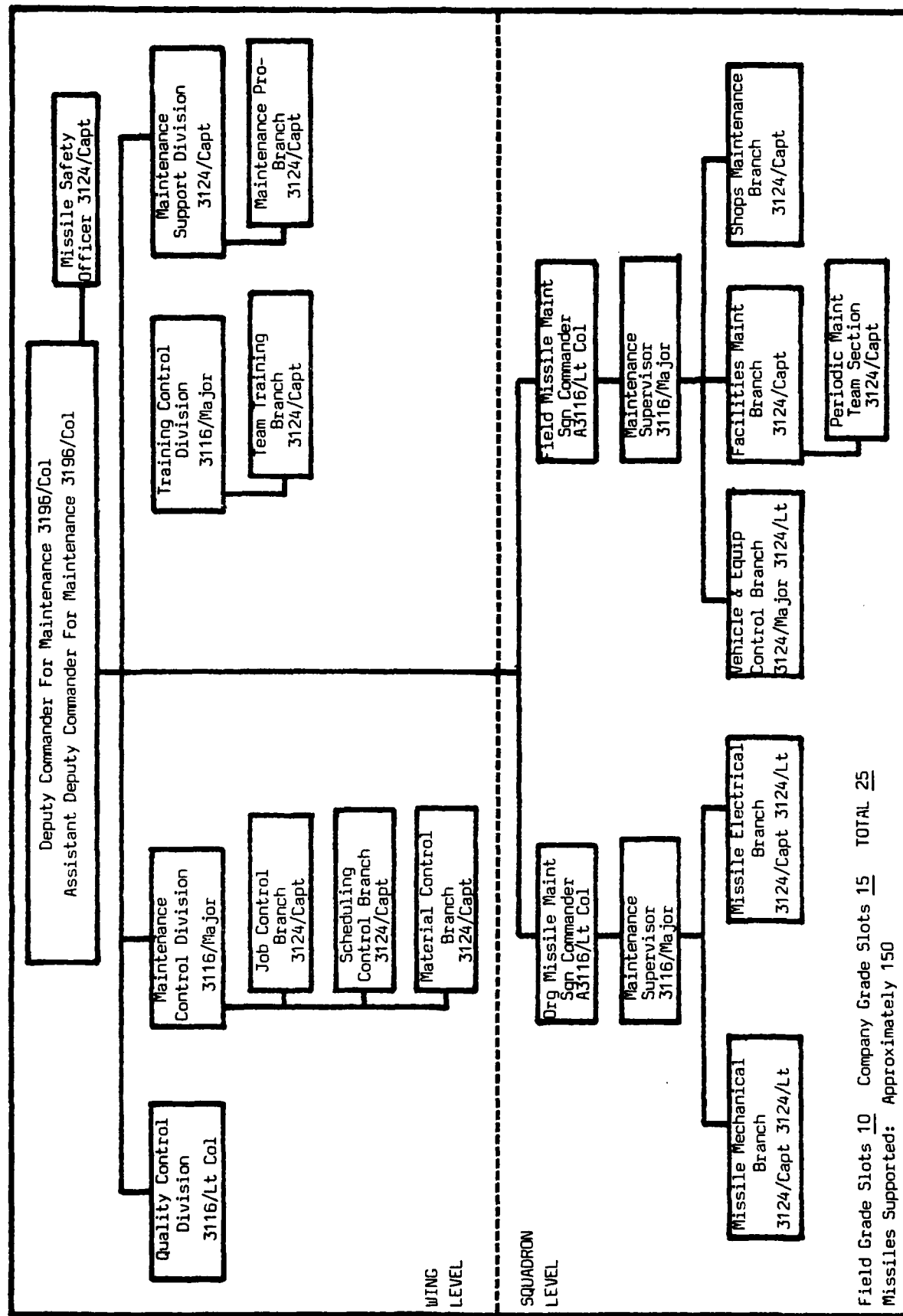


FIGURE 3-4. Typical Maintenance Officer Slots in a Minuteman Missile Wing

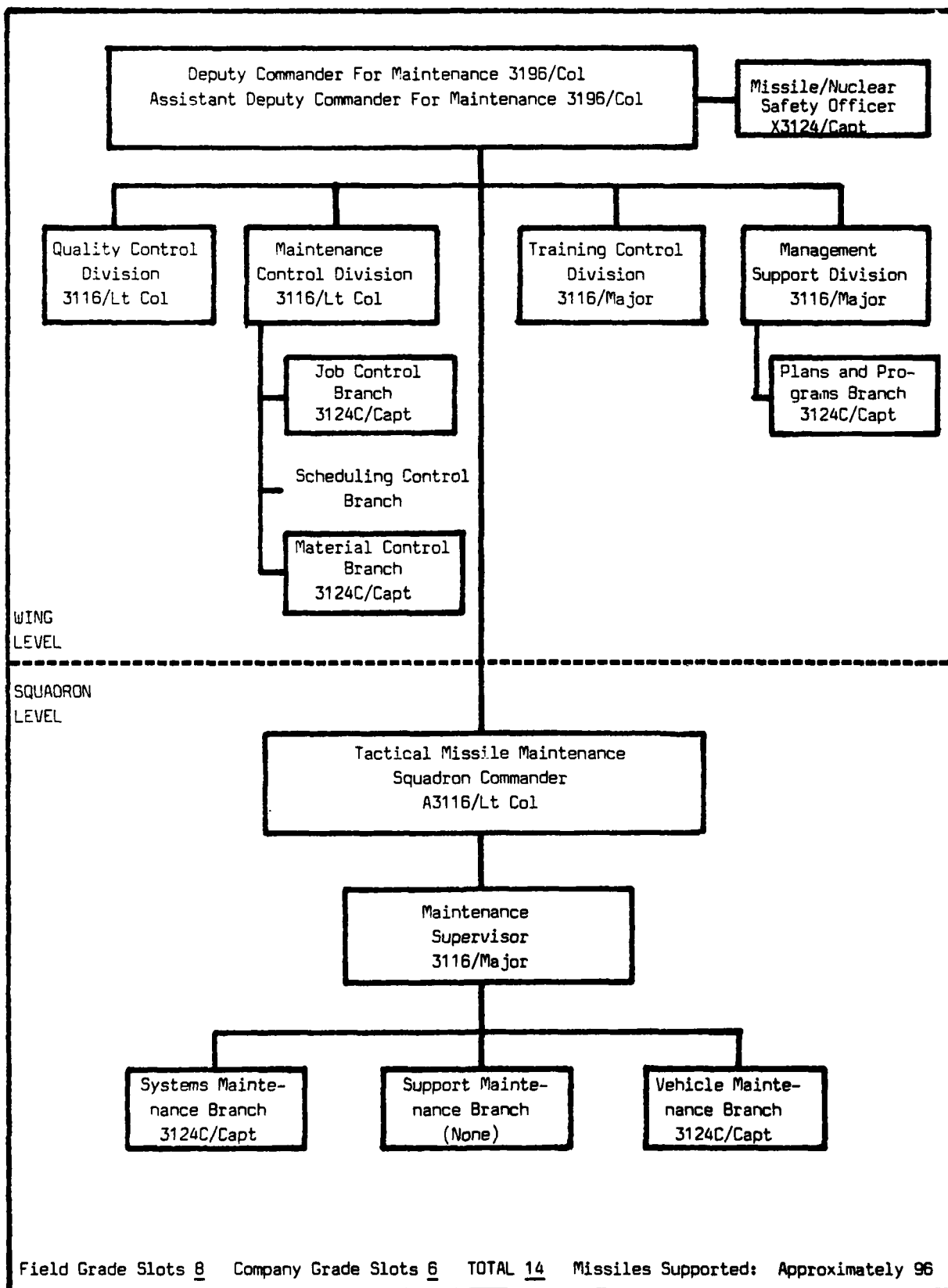


FIGURE 3-5. Typical Maintenance Officer Slots in a Ground Launched Cruise Missile Wing

responsibilities of each officer position in the GLCM maintenance organization since many readers may have little knowledge of the GLCM system. Before discussing the GLCM maintenance organization and the duties and responsibilities of its officers, a brief overview of the GLCM weapon system and its maintenance environment is necessary.

#### Overview of the GLCM Weapon System

Headquarters USAFE Regulation 66-14, GLCM Maintenance Management describes the GLCM weapon system and its maintenance as follows:

A GLCM wing or group consists of three to seven GLCM flights. Each flight is composed of two Launch Control Centers (LCC) and four Transporter Erector Launchers (TEL); each TEL contains four encanistered air vehicles with warheads (all-up-rounds [AURs]). On-base maintenance is usually performed in one of the GLCM Alert and Maintenance Area (GAMA) facilities or the Vehicle Maintenance Facility (VMF). Limited off-base maintenance may be performed at dispersed locations. (14:Vol I, 1-1)

The LCCs and TELs are mobile trailers pulled by 10-ton, eight wheel drive tractors capable of off-road performance. The LCCs look like a camouflaged "18-wheeler" trailer and have internal power generation and air conditioning systems plus accommodations for two launch crew members. The trailer has computer equipment (called the weaponscontrol system or WCS) to monitor and launch the 16 missiles in the flight as well as communications gear (UHF SATCOM, VHF and HF) for command and control.

Both the TEL and LCC are armored against small arms fire. The TEL, like the LCC, has its own power generation systems and its portion of the WCS to receive launch commands from the LCC. The TELs look like camouflaged tank trucks when not erected for launch.

The GLCM concept of operations calls for each flight to disperse into the European countryside during increased readiness conditions to avoid attack. Seventy flight personnel consisting of 44 security police, 19 maintainers, four launch officers, one medical technician, a Defense Force Commander (a security police officer) and a Flight Commander are required to operate, maintain and defend the GLCM flight in its dispersed mode. A GLCM convoy contains four TELs, two LCCs, 10 security vehicles, a wrecker and five supply trucks; all vehicles are off-road capable. Once dispersed, TELs and LCCs are connected to one another in a redundant fashion by means of lightweight fiber optics cables.



The maintenance personnel of a GLCM flight include AFSC 304X4 ground communication specialists for radio maintenance, AFSC 443XOC missile mechanics for repair of TEL subassemblies (and warhead installation and AUR installation when on the Main Operating Base), AFSC 316XOC missile systems analysts for Weapons Control System (computer) repair, AFSC 423X5 aerospace ground equipment technicians for power production and refrigeration repair, and AFSC 472XX vehicle mechanics for maintenance of all convoy vehicles and the TEL and LCC chassis. These technicians are assigned to the Tactical Missile Maintenance Squadron maintenance branches shown in Figure 3-5 until they are called for dispersal at which time they belong to the Flight Commander. No missile maintenance officers participate in the dispersed flight; maintenance leadership is the responsibility of a senior NCO.

The missile itself is a liquid fueled, high subsonic air vehicle, 21 feet long and 21 inches in diameter with a turbofan jet engine. It is boosted into flight by a solid propellant rocket motor. The missile relies on an inertial guidance system and a terrain contour matching radar altimeter to reach its target. The missile is cannistered into an all-up-round (AUR) and is designed to remain dormant for long periods. No maintenance is performed on the missile by Air Force blue suit technicians other than to load the warhead and perform a simple built-in-test (BIT) systems check.

This thumbnail sketch of the GLCM weapon system must be complemented with its concept for maintenance. USAFE Regulation 66-14, GLCM Maintenance Management describes the GLCM maintenance concept:

The GLCM maintenance concept incorporates a two level approach (unit and depot) for GLCM peculiar equipment and the standard three level maintenance concept for items considered as government furnished equipment (GFE) (i.e., generators, radios, etc.) for which there are already established maintenance procedures.

Unit maintenance combines the traditional organizational level and certain cost effective areas of intermediate level maintenance. Traditional intermediate level requirements which are infrequently accomplished and require large investments in facilities, support equipment, personnel, and training are assigned to depot. Adequate built-in-test/built-in-test equipment (BIT/BITE), compact test equipment and fault isolation capability are integral components of the GLCM two level maintenance concept.

Depot maintenance for GLCM peculiar items combines traditional depot level maintenance tasks and those portions of traditional intermediate level maintenance

that are not performed at unit level. Depot maintenance for equipment already in the inventory is in accordance with the established maintenance concept.

GLCM system maintenance at the unit level is performed at the main operating base (MOB), the dispersal training area and the dispersal area (wartime only). Day-to-day operational checks, BIT checks and visual inspections, however, may be performed in unsheltered parking lots and unairconditioned storage shelters. In addition, each MOB possesses Missile Procedures Trainers (MPTs). These trainers are operated and maintained in an environmentally controlled facility. All maintenance tasks performed in the dispersed mode are accomplished without the benefit of environmentally controlled facilities or extensive portable test equipment. All maintenance (except internal LCC work) is performed in the open and is subject to climatic extremes of temperature, humidity, wind, and precipitation. Furthermore, mean time to repair (MTTR) actions are mission dependent and, in some cases along with weather conditions, will determine the level of removal and replacement action to be taken. No maintenance is accomplished on the AUR in the dispersed mode. For dispersed flights, maintenance is limited by the spares carried with the flight. However, other spares/end items which may be required can be supplied from the MOB (if on hand) or other dispersed flights via a re-supply team or the Quick Reaction Maintenance Team (QRMT). (14:Vol I, 1-2, 1-3)

Procurement and weapon system management of GLCM convoy vehicles rest ultimately with the Army Tank Automotive Command (TACOM). The GLCM prime mover 8x8 tractor, M-925 6x6 5-ton cargo truck and eventually the High Mobility Multipurpose Wheeled Vehicle (HMMWV) (the HMMWV is a follow-on to the M-151 jeep now in use) come under the Army maintenance concept which has five levels of maintenance. Figure 3-6 summarizes all levels of maintenance in the GLCM weapon system to the standard Air Force three level concept:

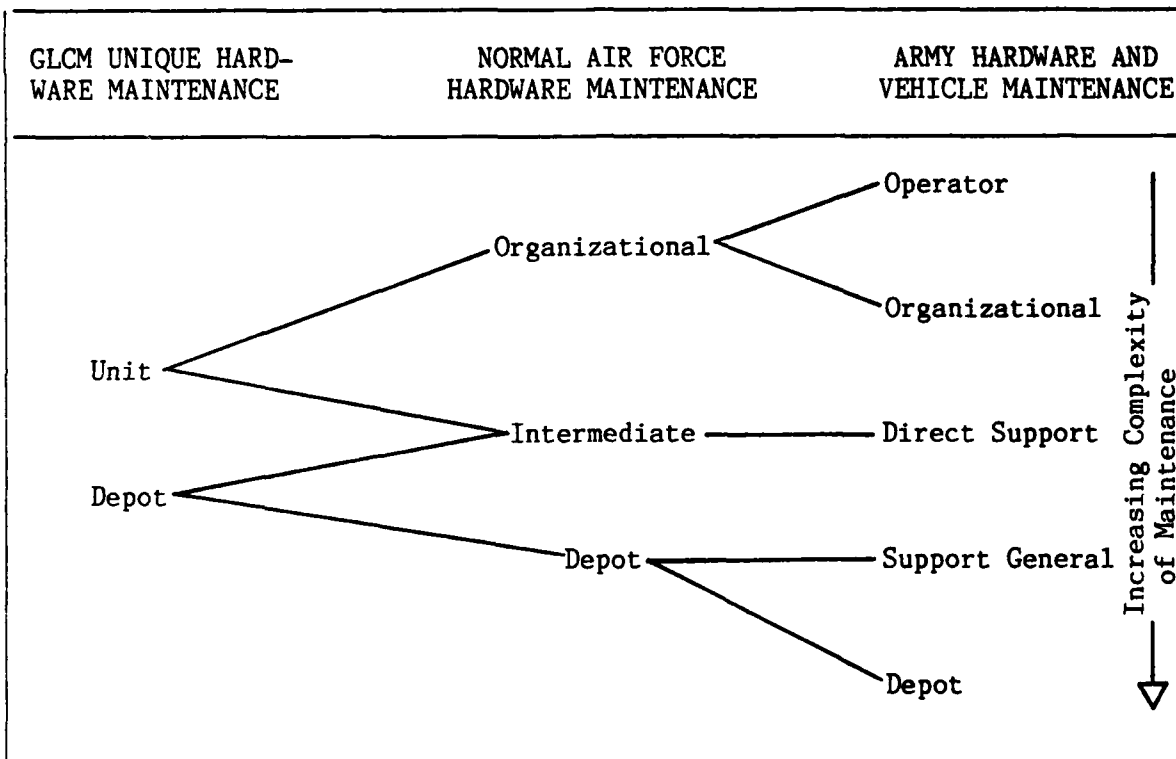


FIGURE 3-6. Summary of Maintenance Levels in the GLCM Weapon System

With this basic introduction to the GLCM weapon system and its maintenance concept, it's obvious that the GLCM weapon system is completely different from SAC missile systems in terms of hardware. But from a management perspective, the organizational structure for managing maintenance production is almost identical, and the GLCM maintenance levels, although diverse, correlate quite naturally to the standard Air Force three levels of maintenance used by SAC. The GLCM weapon system does manage two maintenance specialties which Minuteman and Peacekeeper don't--communications maintenance and vehicle maintenance. As subsequent paragraphs will show, these two specialties have little impact on how USAFE chose to structure its maintenance organization or define the duties and responsibilities of its missile maintenance officers.

As Table 3-1 shows, a comparison of the duties and responsibilities of missile maintenance officers according to SACR 66-12 and USAFER 66-14 indicates there are no differences. Missile maintenance officer duties are similar. In fact, the author must conclude that USAFE maintenance personnel used SACR 66-12 as a pattern for USAFER 66-14. The format and wording

SAC MISSILE MAINTENANCE OFFICER POSITION	USAFE MISSILE MAINTENANCE OFFICER POSITION	KEY DIFFERENCES IN DUTIES AND RESPONSIBILITIES
Common Management Responsibilities Per SACR 66-12 Vol 1, Chapter 3	Common Management Responsibilities Per USAFER 66-14, Vol 1, Chapter 4	None. All USAFE common management responsibilities duplicate those of SAC.
Deputy Cmdr for Maintenance	Deputy Commander for Maintenance	None. Each USAFE DCM responsibility is also a SAC DCM responsibility. Descriptions are virtually identical.
Maintenance Support Division	Management Support Division	Functions of both divisions are the same, but branches are named differently. SAC's Maintenance Programs Branch and Technical Engineering Branch perform the same duties as USAFE's Plans and Programs Branch and Technical Engineering Branch. SAC has a Maintenance Data Branch which provides management for automated data systems, maintenance documentation and maintenance analysis. USAFE's structure has the Data Management Branch performing automated data system management and maintenance documentation and a Maintenance Analysis Branch to perform maintenance analysis function.
Maintenance Programs Branch	Plans and Programs Branch	None. Each USAFE responsibility is also a SAC responsibility.
Maintenance Control Division	Maintenance Control Division	USAFE Maintenance Control monitors vehicle maintenance for GLCM vehicles (and depending on the wing structure, may monitor maintenance of all base vehicles). (34:Vol III, 1-1)
Scheduling Control Branch	None	USAFE Scheduling Control Branch manned by NCO. Similar responsibilities to the SAC function. USAFE has no Briefing Debriefing Function or Maintenance Processing Function.
Job Control Branch	Job Control Branch	None. Each USAFE responsibility is also a SAC responsibility. Descriptions are virtually identical.
Materiel Control Branch	Materiel Control Branch	Both SAC and USAFE Materiel Controls have similar Maintenance Supply Liaisons. USAFE has a Repairable Cycle Monitor function to handle repair cycle assets which is handled in SAC under Scheduling Control (Maintenance Processing Function). SAC Mat Controls have a supply point function while USAFE includes these duties under MSL.

TABLE 3-1. Comparison of SAC and USAFE Missile Maintenance Officer Duties and Responsibilities

SAC MISSILE MAINTENANCE OFFICER POSITION	USAFE MISSILE MAINTENANCE OFFICER POSITION	KEY DIFFERENCES IN DUTIES AND RESPONSIBILITIES
Training Control Division	Training Control Division	None. USAFE Training Management Branch and SAC Consolidated Training Branch have similar responsibility.
Team Training Branch	None	None. USAFE has a Specialist Training Branch which conducts dispersal training, special technical training and vehicle operator training. (34:Vol IV, 4-1) Its primary function is to train personnel to perform effectively as a team. (34:Vol IV, 4-2) This is the same purpose of SAC's Team Training Branch. (35:Vol IV, 4-1)
Quality Control Division	Quality Control Division	None. Minor cosmetic differences between USAFE's Quality Assurance Program and SAC's Maintenance Standardization and Evaluation Program.
Organizational and Field Missile Maint Squadron Cmdr	Tactical Missile Maintenance Squadron Commander	None. SAC description of commander duties is somewhat more complete than USAFE's, for example, emphasis on equipment control, and morale and welfare of personnel.
Maintenance Supervisor	Maintenance Supervisor	None. Virtually all GLCM MA duties are the same (verbatim) as SAC MA duties. USAFE does require its MA to ensure personnel have been properly trained and initially evaluated by QC before performing any nuclear critical maintenance tasks. (34:Vol VI, 1-3)
Branch Chiefs	Branch Chiefs	Duties and responsibilities are broadly similar. SACR 66-12 says a branch chief is responsible to the MA for the management of a specific functional area in the maintenance squadron. (35:Vol VI, 1-4) USAFER 66-14 says the same thing. (34:Vol VI, 1-4) From here, each regulation emphasizes different (but minor) areas of responsibilities based on the particular weapon system. Some duties stated in SACR 66-12 were not listed in USAFER 66-14 but would be applicable (and vice versa).
Section Chiefs	None	

TABLE 3-1. Comparison of SAC and USAFE Missile Maintenance Officer Duties and Responsibilities (Cont'd)

of both regulations are very similar. The similarity is not unexpected since members of the USAFE maintenance staff have extensive SAC missile maintenance backgrounds; indeed all missile maintenance officers in the GLCM weapon system have prior SAC missile maintenance experience.

Are the duties and responsibilities of SAC and TAF missile maintenance officers similar? The answer is yes. The hardware in each weapon system may differ, but the management responsibilities remain the same as evidenced by the similar maintenance organizational structures in SAC and USAFE as well as duties expressed in SACR 66-12 and USAFER 66-14 (draft). Because of similar missile maintenance officer duties in both SAC and the TAF, there exists an opportunity to combine training programs, especially with respect to the management of missile maintenance systems.

#### SHARING OF MISSILE MAINTENANCE OFFICERS BETWEEN SAC AND THE TAF

This paper has established that opportunities exist to change missile maintenance instruction programs because they don't appear to meet MAJCOM training desires for management emphasis. The paper further established that an opportunity to combine missile maintenance officer training exists because the duties of SAC and TAF missile maintenance officers are similar. The paper now examines if missile maintenance officers in SAC and the TAF will be shared and to what degree they will be shared. If cross-utilization of the 31XX resource would not occur or would occur infrequently, then combining missile maintenance officer courses still may not be necessary or desirable (even though they have similar duties). However, if major commands will share these officers, then their sharing and similar duties give more credence to a common course of missile maintenance officer instruction.

Actual data on the degree of sharing of missile maintenance officers is not available because the GLCM weapon system is not fully deployed and won't be until 1988. So a discussion of how much sharing will occur must be made on projections of manpower authorizations through 1988 (the time when GLCM is fully deployed). An inherent problem with projections is that in an expanding weapon system such as GLCM, actual figures are subject to change. This paper will treat manpower projections for what they are--estimates. Conclusions will be drawn based on relative orders of magnitude of manpower projections rather than on the precise figures themselves.

A baseline for projecting 31XX manpower authorization appears in Figure 3-7. This figure shows Air Force Military

Personnel Center (AFMPC) projections through June 1984 and was compiled as of 13 July 1983. (23)

COMMAND OR AGENCY	A 311X	B 312XG (Note 1)	C 312XF (Note 2)	D 312XZ (Note 3)	E 3196	F TOTAL
United States Air Forces Europe	14	0	0	17	4	35
Air Force Logistics Command	1	7	4	5	0	17
Air Force Systems Command	4	3	1	2	0	10
Air Training Command	3	3	3	4	0	13
Air Staff	2	0	0	0	0	2
Strategic Air Command	125	165	60	11	34	395
Tactical Air Command	8	0	0	5	0	13
Air Force Opera- tional Test and Evaluation Center	7	1	0	0	2	10
Air Force Military Per- sonnel Center	1	0	0	0	0	1
USAF Inspection Safety Center	4	0	0	0	1	5
TOTAL	169	179	68	44	41	501
Source: AFMPC Projected Manning 31XX Career Field, 13 Jul 83						
<u>Notes</u> 1. Minuteman System 2. Titan II System 3. Ground Launched Cruise Missile (GLCM), Peacekeeper (MX) and Misc.						

FIGURE 3-7. Projected Missile Maintenance Officer 31XX Authorizations (June 1984)

Figure 3-7 projects 501 missile maintenance officer authorizations in the Air Force as of June 1984. United States Air Forces Europe has 35 GLCM authorizations overseas while other commands have 466 slots in the CONUS. Of these CONUS authorizations, TAC has 13 with about another ten GLCM maintenance officer slots distributed among the various supporting commands. The current authorization situation looks like this when comparing CONUS versus overseas 31XX authorizations and GLCM versus non-GLCM authorizations:

<u>CONUS AUTHORIZATIONS</u>	<u>OVERSEAS AUTHORIZATIONS (GLCM)</u>
466	35
- non-GLCM=443	
- GLCM=23	

FIGURE 3-8. Approximate CONUS Versus Overseas 31XX Authorizations  
June 1984

This current projection through June 1984 includes partial 31XX manning for two of the six GLCM main operating bases (MOBs) (Greenham Common, England and Comiso, Italy). Using manpower figures from the USAFE GLCM Hardline Manpower Document(S), manpower authorizations can be projected through 1988 to fully man all six GLCM MOBs. (13) To fully man GLCM MOBs through 1988 approximately 60 more authorizations will be added to the USAFE roles bringing total USAFE GLCM 31XX manning to 95 authorizations.

While GLCM 31XX manpower expands during the years 1984 to 1988, SAC manpower will decrease for two reasons. First, Titan will be phased out by 1987. The 60 Titan 312XF authorizations shown in Figure 3-7, column C, will likely, in effect, be transferred to GLCM USAFE authorizations. Secondly, Peacekeeper will not require additional 31XX manpower authorizations as these missiles will merely replace Minuteman missiles in silos at F.E. Warren AFB, Wyoming. (21)

Thus projecting manpower authorizations through 1988 and comparing CONUS versus overseas 31XX authorizations and GLCM versus non-GLCM authorizations shows:



<u>CONUS AUTHORIZATIONS</u>	<u>OVERSEAS AUTHORIZATIONS (GLCM)</u>
406	95
- non-GLCM=383 (SAC=335)	
- GLCM=23	

FIGURE 3-9. Approximate Projected CONUS Versus Overseas 31XX Authorizations 1988

This analysis shows some important trends. First, overall 31XX manning authorizations in the Air Force should remain stable through 1988 as GLCM expands and Titan deactivates. It also shows that of the 500 31XX authorizations about 100 will be GLCM overseas, 25 will be GLCM CONUS and 375 authorizations will support the SAC missile force. This means that since 20 percent of the 31XX authorizations are overseas, a career missile maintenance officer has a 20 percent chance of an overseas GLCM assignment (or in a 20 year tour can expect one four year GLCM overseas assignment).

Note also that there is an overseas imbalance in 31XX GLCM assignment opportunities. There will be 100 GLCM slots overseas but only 25 in CONUS. Thus, this imbalance drives sharing of 31XXs between SAC and the TAF. It will be unlikely that all 31XXs assigned to the GLCM weapon system can remain there throughout their missile maintenance career.

Thus, because of the overseas imbalance in GLCM positions, one can conclude that an opportunity for sharing missile maintenance officers between SAC and the TAF does exist. Furthermore, this opportunity is roughly 1 in 5 (or 20 percent) for a career.

Up to this point three important trends have been established:

- MAJCOM training desires aren't being met (an opportunity for change exists).
- Duties of missile maintenance officers are similar in both SAC and the TAF (an opportunity for combining missile maintenance officer training).

- And, as this section has established, there will be sharing of missile maintenance officers among MAJCOMs, especially between SAC and the TAF (another opportunity to combine missile maintenance officer training which complements the above opportunity).

The next section will investigate if an opportunity to save money might exist if we combined missile maintenance officer training programs.

### THE OPPORTUNITY TO SAVE MONEY

Is there an opportunity to save money (or resources expressed in monetary terms) by combining missile maintenance officer courses? If so, how much? The answers to these questions are difficult to determine. In fact, it's risky to approach the subject of cost since we're attempting to consider the cost of a training program (i.e., some kind of combined training course) that does not exist. The best that can be done is to attempt to predict the relative opportunity to save money and its relative magnitude.

To do this, two aspects of training costs need to be examined: overhead costs and personnel costs. Overhead costs constitute facilities, weapon system hardware, trainers and needed support equipment for the weapon system being taught. Personnel costs would include salaries of instructors and students as well as travel and per diem expenses for those students.

#### Overhead Training Costs

Chapter One explained that Minuteman (and probably Peacekeeper) training takes place at Chanute Technical Training Center, Illinois, and that GLCM operations and maintenance training occurs at the 868th Tactical Missile Training Squadron (TMTS) at Davis-Monthan AFB, Arizona. It is important to understand that in addition to training missile maintenance officers, both training centers conduct technical missile maintenance training for airmen who must actually maintain these weapon systems. At both training sites, maintenance officer training is a small portion of the total missile maintenance training activity. As such, all weapon system hardware and facilities used by maintenance officer courses at either site is shared with airmen technical training courses. Regardless of whether missile maintenance officer courses were conducted or not, the overwhelming majority of hardware, facilities and support equipment at Chanute or Davis-Monthan would still be needed to conduct airmen technical training.

Thus, it does not appear that by combining missile maintenance officer training, one can say the opportunity to reduce overhead training costs is significant.

On the other hand, overhead training costs might increase slightly if missile maintenance officer courses were combined. How much would depend on just how a combined course was organized. Because Chanute AFB has a significant investment in Minuteman training equipment and facilities, most training managers appear to favor this site as one for a combined missile maintenance officer course. The GLCM system, being a mobile system, is relatively flexible (training wise) and could adapt fairly easily to a move to Chanute. It has only three major components (missile, launch control center (LCC) and transporter erector launcher (TEL)) which could be easily fabricated by Air Force training aids technicians (one has but to tour the training aids facility at Chanute AFB to see this work is well within their capabilities!). These mockups would cost far less than actual GLCM equipment. The point is that even a universal missile maintenance officer course as proposed by the TAF is going to require some GLCM training and hardware assets, no matter how much the universal course emphasizes management.

Thus, as far as overhead costs are concerned, there appears no real opportunity to reduce these costs by combining missile maintenance training. Indeed, depending on how maintenance training is combined, overhead investment could likely rise, even with a "universal" missile maintenance officer course which had heavy emphasis on management topics instead of emphasizing hardware.

#### Personnel Training Costs

Although our investment in facilities and hardware might not decrease by combining training programs, could an opportunity to save personnel costs exist? Would this savings opportunity be significant?

To answer these questions it is necessary to examine the total training system flow between SAC maintenance officers and those of the TAF as they are shared, assuming each command will conduct its own training. After doing this, one should ask two questions. First, are there redundancies in SAC and TAF maintenance officer training programs? For example, if a SAC officer completes initial training at Chanute, serves a three year assignment at a Minuteman base, and then enters GLCM training, is he being taught the same information he learned at Chanute? (Similarly, one would want to reverse this and see how an officer going from TAC to SAC would fare.) The redundancy would offer an opportunity to save money which a combined course could alleviate. Secondly, we could assume a universal course no

longer than the combined length of SAC and proposed TAF courses and see what impact one course over two would have on student travel and per diem expenses.

What is the training system flow between SAC and the TAF, and given this system, how much redundancy exists in the programs? According to the training OPRs at HQ SAC, officers entering SAC from GLCM assignments can expect to attend technical training at Chanute AFB in Course C30BR3121G 006, Missile Maintenance Officer WS-133, Accelerated. (21:2) Pending the decision on whether a universal missile maintenance officer course will be offered, HQ TAC has not yet approved the implementation of the basic GLCM missile maintenance officer course proposed by the 868 TMTS in September 1983. However, since this is the only well-documented training proposal available, the author will use it for comparison purposes. Thus, for an officer attending initial GLCM training, serving an entry level assignment at a GLCM base, and then being assigned to a SAC missile unit, the training flow would likely appear like this:

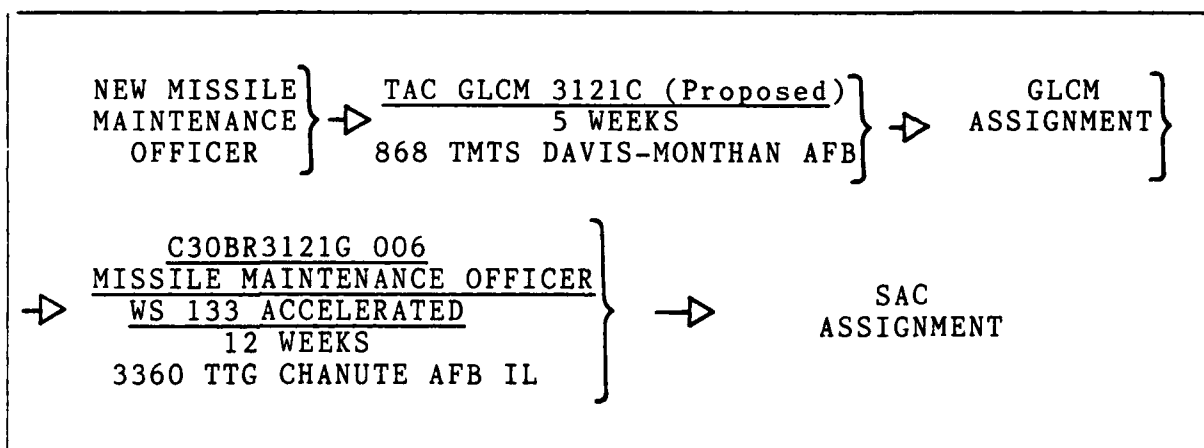


FIGURE 3-10. Training Flow TAF to SAC Assignment

The reverse of this scenario, where an officer is trained at Chanute, serves a Minuteman assignment and then enters the GLCM weapon system appears like this:

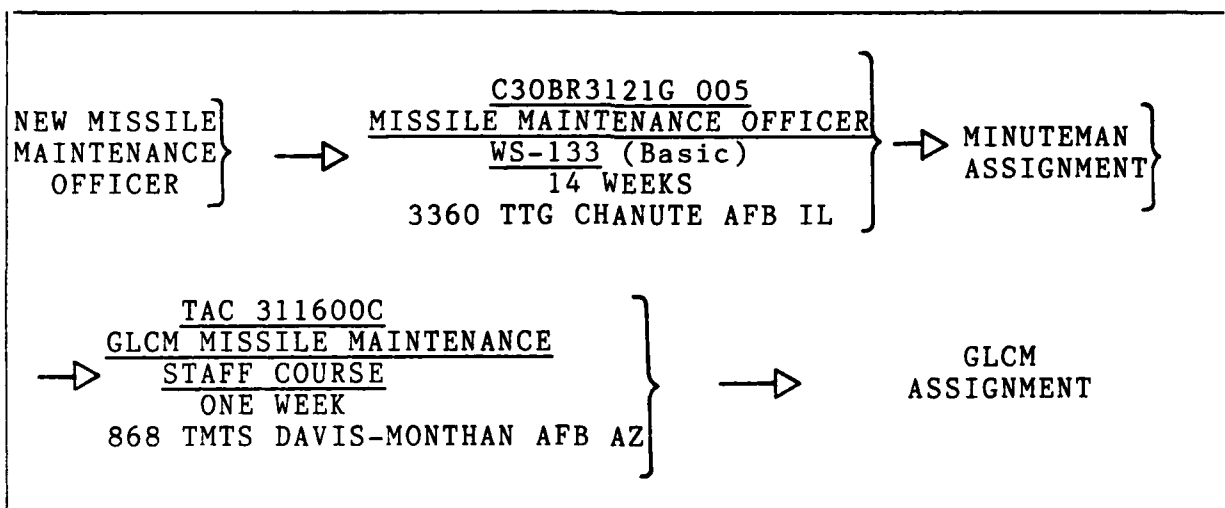


FIGURE 3-11. Training Flow SAC to TAF Assignment

From these two figures, redundancies in training programs must be compared this way:

- TAC GLCM 3121C (Proposed) versus C30BR3121G 006 Minuteman, Accelerated (Figure 3-10)
- C30BR3121G 005 Minuteman Basic versus TAC 311600C, GLCM Missile Maintenance Staff Course (Figure 3-11)

To determine how much redundancy exists between these courses, the author used the analysis of each course in Appendix B to compare each course's training objectives to see where a case could be made for obvious hardcore redundancy. Figure 3-12 shows the author's findings for training overlap between Course TAC GLCM 3121C (Proposed) and Course C30BR3121G 006 Missile Maintenance Officer WS-133, Accelerated:

<u>COURSE TAC GLCM</u> <u>3121C (Proposed)</u>		<u>COURSE C30BR3121G 006</u> <u>Missile Maintenance</u> <u>Officer</u>		Net Redundancy (Hours)
TOPIC	HOURS	TOPIC	HOURS	
Legal/UCMJ/ Basis for Auth	3	Legal Aspects of Military Mgt	8	3
Maint Forms	2	AFTO Forms 349/ 350	3	2
MDC/MMICS	3	MMICS	2	2
Supply System	1	Supply System	8	1
Mgt Lab	6	Direct and Con- trol Maint	7	6
HARDCORE TRAINING OVERLAP IN HOURS = 14				

FIGURE 3-12. Areas of Hardcore Training Redundancy  
(TAC GLCM 3121C versus C30BR3121G 006)

As Figure 3-12 shows, less than two days hardcore redundancy exists between these two courses. Note that each topic area falls within the categories of "maintenance management" or "application of maintenance management." It has already been established that the duties and responsibilities of missile maintenance officers are similar in SAC and the TAF; therefore, one could also state that, generally speaking, all maintenance subjects taught by these two courses are basically similar or at least, not dissimilar. If one refers back to Figures 3-2 and 3-3, one finds the subjects "maintenance management" and "application of maintenance management" represented this way:

- TAC 3121C
  - maintenance management subjects = 45 hours
  - application of maintenance management = 6 hours
- C30BR3121C 006
  - maintenance management subjects = 64 hours
  - application of maintenance management = 24 hours

Comparing the two courses in this very broad fashion shows a net redundancy of 51 hours or about six days training. Before putting a price tag on this six days of redundant training, a comparison for redundancy must be made between the second set of courses as shown in Figure 3-11 (SAC to TAF assignment training flow).

A comparison for redundancy in these two courses, C30BR3121G 005 and TAC 311600C is simple--there is no redundant training because the TAC GLCM Missile Maintenance Staff Course is strictly oriented to the GLCM weapon system. The TAC Course Guide for TAC 311600C is very specific in the course's purpose:

To provide senior and middle missile maintenance managers an overall familiarization with the Ground Launched Cruise Missile (GLCM) weapon system concepts and operation. The scope of the GLCM Missile Maintenance Staff Course includes the following areas: GLCM Weapon System Concepts; familiarization with GLCM Weapon System hardware; GLCM NATO Operation; and GLCM Dispersal Operation. (12:1-1)

As far as personnel training costs are concerned, it has been established that the training system serving missile maintenance officers going from initial SAC assignments to TAF GLCM assignments is not redundant. But, officers who receive their initial missile maintenance experience in GLCM and receive follow-on training in Minuteman may expect redundant training in the maintenance management area of between two to six days. How significant is this?

To answer this question, one must know about how many maintenance officers will be shared between the TAF and SAC training systems each year. The salaries and per diem required of these officers plus the salary of one instructor (author's assumption) would give an approximate dollar opportunity cost.

The degree of sharing of maintenance officers was discussed earlier in this chapter (see Figure 3-7). An approximate number of officers "switching" weapon systems each year can be derived by assuming officers want to stay in GLCM ("best" case) and conversely that they don't ("worst" case). In the "best" case scenario, every 31XX officer will want to stay in the GLCM System (i.e., they will generally opt for a four year overseas tour in USAFE and a three year tour in CONUS). Thus one-fourth of USAFE GLCM 31XXs will rotate each year and one-third of the CONUS GLCM 31XXs will rotate. (In this scenario it will be assumed that CONUS GLCM assignments will be filled with officers with USAFE overseas experience). Upon rotation each year, assuming all officers want to stay in the GLCM weapon system, the following can be expected:

- 25 leave USAFE for CONUS assignment  
(1/4 X 100 USAFE GLCM slots)
- 8 leave CONUS GLCM slots for USAFE  
(1/3 X 25 CONUS GLCM slots)
- 8 of the 25 USAFE officers fill the CONUS GLCM positions leaving 17 officers to seek assignments in the other 375 CONUS 31XX slots (i.e., either Minuteman or Peacekeeper weapon systems)

Similarly, in the "worst" case scenario, 31XXs don't want to remain in GLCM--they want to stay only the minimum overseas accompanied tour (three years) and will remain in CONUS GLCM slots for only three years. Upon rotation each year this can be expected:

- 33 leave USAF for CONUS assignment  
(1/3 X 100 USAFE GLCM slots)
- 8 leave CONUS GLCM slots for USAFE  
(1/3 X 25 CONUS GLCM slots)
- 8 of the 33 USAFE officers fill CONUS GLCM positions leaving 25 officers to seek assignments in the other 375 CONUS 31XX slots (i.e., either Minuteman or Peacekeeper weapon systems)

This analysis shows that between 17 and 25 missile maintenance officers each year can be expected to transition between GLCM and non-GLCM assignments. Expressed another way, an average of 21 missile maintenance officers will be exchanged by SAC and the TAF each year.

Twenty-one officers per year involved in roughly a week's redundant training can be costed in this manner:

[\$84.04 per day salary + 50.00 per diem]  
X 7 days X 21 officers = \$7,434.00\*

If we add the cost of one instructor (\$84.04/day X 7 days = \$588.28), the cost climbs to \$8,022.28. In terms of relative order of magnitude, eight thousand dollars is an insignificant personnel cost. If you get very strict and apply only two day's redundancy as shown in Figure 3-12, the cost drops to less than \$2,300.00.

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\*Assumes nonrated Captain over four years commissioned service, married; does not include Variable Housing Allowance costs. Source: AF Military Pay Guide, 1 Jan 1984.



One more aspect of personnel training costs should be addressed. If there were a single missile maintenance officer course, instead of two or more courses, could a savings in travel expense take place? Again, how significant would this savings be? The twenty-one officers shared by SAC and the TAF each year under the existing training scenario are where the combination of course instruction would pay off since the requirement for them to attend a second training course would be deleted. However, the 21 officers which are shared really means that 21 officers are entering the SAC/ATC training system and 21 offices are entering the TAF system each year as shown below:

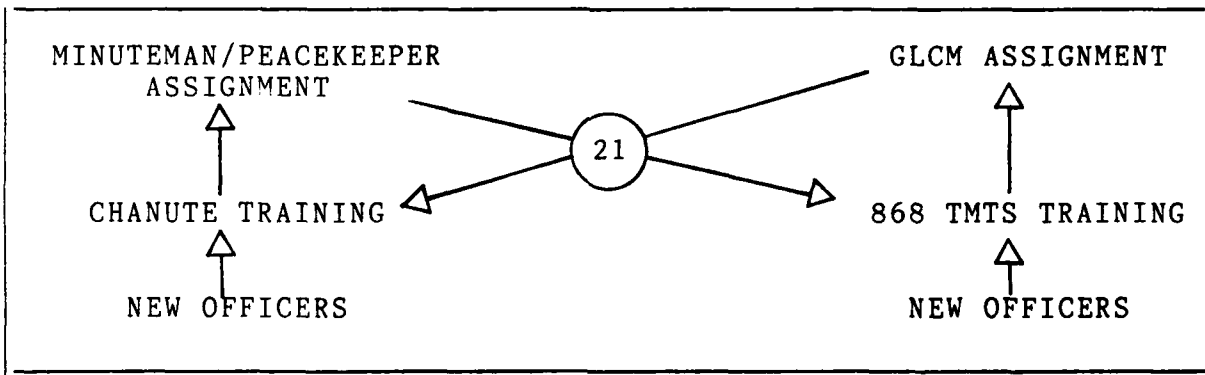


FIGURE 3-13. Sharing of Missile Maintenance Officers Among Weapon Systems (Current Scenario Through 1988)

What we really have is an exchange of 42 maintenance officers who require training. If training programs were combined, then the sharing between SAC and the TAF would appear this way:

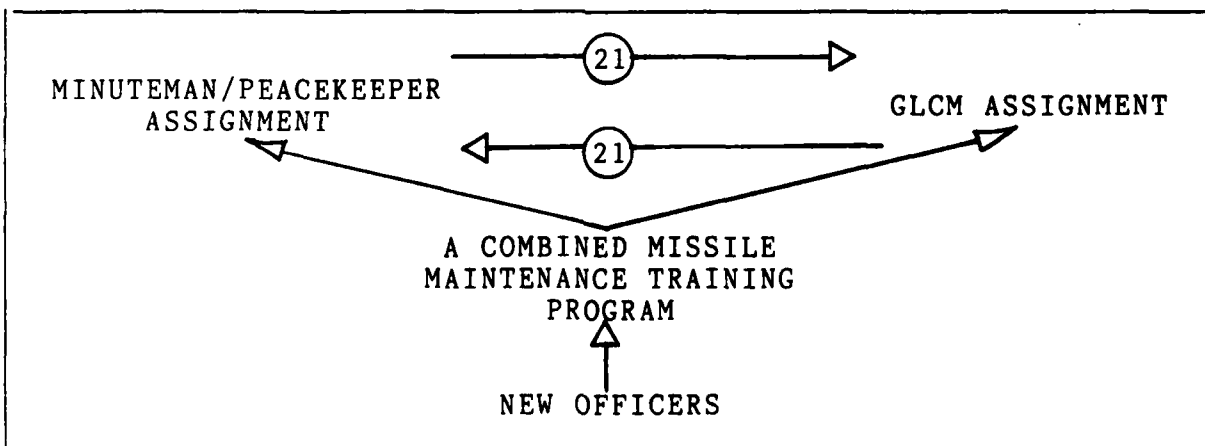


FIGURE 3-14. Sharing of Missile Maintenance Officers Among Weapon Systems (Combined Training Scenario)

Note that 42 officers are spared the travel costs of attending another program.

How much is this worth? It's difficult to pin down simply because each officer's origin is unknown as is his eventual assignment. We do know, for example, that those officers returning from an initial GLCM assignment overseas will (at least theoretically) travel past Chanute AFB, Illinois, before they arrive at their Minuteman/Peacekeeper assignment. This is true since the majority of SAC assignments lie geographically west of Chanute AFB and European port calls are held on the east coast. Assuming, very conservatively, that the airlines will charge extra (say \$200.00) to stop at Chanute prior to leaving for a new SAC assignment, our 21 GLCM officers who attend Chanute training prior to assuming Minuteman duties can expect to cost the government an extra \$4,200.00.

Officers leaving Minuteman to attend 868 TMTS training prior to a GLCM assignment might incur higher travel costs, especially for those officers travelling from Minot and Grand Forks, North Dakota. Assume it costs \$500.00 extra to make the trip to Davis-Monthan instead of proceeding directly to a GLCM assignment. In this case 21 SAC officers transitioning to GLCM would add \$10,500.00. Thus, assuming only one combined training course for all 31XX officers were in being, there would be an opportunity to save \$14,700.00 per year in extra travel monies. This amount represents a savings opportunity, but not one of overwhelming proportions.

The intent of this section and its cost analysis has been to determine if an opportunity to save money exists by combining missile maintenance officer training programs. Three areas have been considered: overhead training costs, personnel training costs incurred as a result of redundant training programs and personnel travel costs to attend missile maintenance training. Because of the speculative nature of this exercise one can only conclude that by combining training programs an opportunity to save money probably does exist, not from a reduction in overhead costs (which may rise), but through a savings in the reduction in redundancy of concurrent courses and by reducing travel costs to a second training area enroute to a new missile assignment. These cost factors do not appear significant enough to act as a prime driving force to combine training programs. Only when the location and duration of a combined training program are known can the cost opportunity be well understood.

To this point four areas of the environment of opportunity in missile maintenance officer training have been examined. One final area, the opportunity to improve the quality of training, will be examined next.

## THE OPPORTUNITY TO IMPROVE TRAINING QUALITY

Is there an opportunity to improve the quality of missile maintenance officer courses if they were combined? How would quality be measured? To be sure, the quality of training programs can really be measured in how a job is accomplished. All would readily agree that accomplishing a mission is why training is conducted. Is there any hard evidence that current missile maintenance officer training programs prevent officers from accomplishing the missile maintenance mission? According to the HQ SAC/LGBA OPR for missile maintenance officer training, while SAC might want to move from a hardware emphasis to a management emphasis, there is no perceived crisis in the training of SAC maintenance officers. (33:--). In short, from the SAC perspective, "the job's getting done." From the author's personal involvement with the growth of the GLCM weapon system and its training system, the TAF perspective might be summarized as "the job's getting done--however, there's a better way." Thus, the impetus for changing missile maintenance programs originates from a desire to improve training programs for improvement's sake, not because they fail to help accomplish the maintenance mission. But if mission accomplishment won't serve as a useful measure of training quality, what will?

There are two other aspects of training which can help to assess the quality of training programs. First, one might compare missile maintenance officer training programs with other successful maintenance officer training programs to see if they offer meaningful ways to increase the quality of training. Secondly, one might also examine the qualifications of the instructor force. Do missile maintenance officer instructors appear as qualified as their counterparts in other maintenance officer specialties?

### Missile Maintenance Officer Training Programs Compared to Aircraft Maintenance Officer Training Programs

Some members of the HQ TAC/LG staff feel the Aircraft Maintenance Officer Course (AMOC) conducted at Chanute AFB, Illinois, is the model that missile maintenance officer training programs should follow. In May 1982 Captain Jim Davidson (HQ TAC/LGWLG) visited the AMOC facility, observed their training program and concluded in his trip report:

I was extremely impressed with the AMOC effort. In my opinion, they have the right approach to training--basics of maintenance management and application . . .  
(19:2)

He concludes his report with a recommendation to develop the GLCM maintenance officer course along the same line as the AMOC.

(19:2) Because of HQ TAC interest in the AMOC program, the author felt compelled to compare this program with missile programs to see where they are different and if this difference shows an opportunity to improve the quality of missile maintenance officer training programs. Before comparing missile maintenance officer training programs with aircraft maintenance officer training programs, one might rightfully ask why aircraft training and missile training can be compared in the first place. (After all, isn't missile maintenance different from aircraft maintenance?)

The answer is "yes--and no." From a technician perspective, aircraft maintenance is different (take for example, the repair of avionics, airframes, jet engines--all of which require skills and AFSCs not used in missile maintenance). However, from a broad management perspective (which is also the maintenance officer perspective), aircraft maintenance and missile maintenance management tasks are almost identical. A comparison of the duties and responsibilities of the missile maintenance officer (AFSC 3124) and the aircraft maintenance officer (AFSC 4024) as written in AFM 36-1, Officer Classification Regulation shows the two specialties to be virtually identical in their management taskings. (15:A13-7/8, A13-15) Because of the closeness of aircraft and missile maintenance officer duties, it is valid to compare their training programs.

According to AFM 50-5 USAF Formal Schools Catalog, there are three aircraft maintenance officer courses:

- C30BR4021 001--Aircraft Maintenance Officer (Accelerated) (4 weeks duration)
- C30BR4021 002--Aircraft Maintenance Officer (Basic) (20 weeks duration)
- C30BR4021 003--Aircraft Maintenance for Munitions Officers (3 weeks 2 days duration) (17:3-62)

The author examined the first two AMOC programs because these deal strictly with the aircraft maintenance officer (as opposed to the aircraft maintenance for munitions officer course) and correlate well with the Minuteman missile maintenance officer courses taught by ATC for SAC. Course 30BR4021 002, Aircraft Maintenance Officer is designed to provide training for Air Force officers entering the aircraft maintenance field without regard for background or prior skills. (6:1) The purpose of this course is similar to that of Course 30BR3121G 005, Missile Maintenance Officer (WS-133) offered for SAC missile maintenance officers. Course 30BR4021 001, Aircraft Maintenance Officer Accelerated is designed to provide training for rated captains and field grade Air Force officers scheduled to enter the air-

craft maintenance field or for career broadening. (7:1) This course correlates well with Course 30BR3121G 006, Missile Maintenance Officer (WS-133) (Accelerated).

The analysis of these two AMOC programs was done exactly as for the missile maintenance training programs to determine how each compares in emphasizing:

- weapon system(s) hardware
- observation/performance of maintenance tasks
- maintenance management subjects
- application of maintenance management principles
- other

Appendix C contains the worksheets used to analyze AMOC training programs. Figure 3-15 shows the analysis of the basic AMOC training program, Figure 3-16 shows the analysis of the accelerated AMOC programs, and Figure 3-17 compares the Minuteman and GLCM training programs to the AMOC programs.

Note in Figure 3-17 that the basic AMOC program consists of 24 percent weapon system hardware topics and 74 percent maintenance management/application of maintenance management. Conversely the Minuteman (SAC) and GLCM (TAF) basic courses place about 70-72 percent emphasis on weapon system subjects and 25 percent on maintenance management/application of maintenance management. Thus basic missile maintenance officer training programs stress weapons systems hardware training over maintenance management three to one; *the basic AMOC program does the exact opposite*. Since both missile maintenance officers and aircraft officers perform the same basic management functions, one might conclude that from a management perspective, the aircraft maintenance officer starts his career with a better management background than his missile counterpart.

The basic AMOC program's emphasis of management subjects has another feature of importance--depth of knowledge. Figure 3-15 shows the depth of training of "application of maintenance management principles" to be 61 percent 2b level (PARTIALLY PROFICIENT--can do most parts of task; may not meet local demands for speed or accuracy) and 39 percent 3c level (COMPETENT--can do all parts of the task; meets minimum local demands for speed and accuracy). This is in contrast to the basic Minuteman officer course and GLCM programs which teach no further than the 2b level.

BASIC CATEGORY OF TRAINING	NUMBER OF HOURS	AVERAGE TRAINING LEVEL	PERCENT OF COURSE
1. Weapon System Subjects	172	B	24
2. Observation of or Partic- ipation in Maintenance Tasks	0	N/A	N/A
3. Maintenance Management Subjects	318	B	44
4. Application of Mainte- nance Man- agement Principles	215	39% 3c/61% 2b	30
5. Other	11	A-B	2
TOTALS	716*	---	100
Reference: CTS C30BR4021 002 30 Oct 1978 POI C30BR4021 002 2 Feb 1982  *Technical Training--does not include testing or military training hours.			

FIGURE 3-15. Analysis of Course 30BR4021 002, Aircraft Maintenance Officer

BASIC CATEGORY OF TRAINING	NUMBER OF HOURS	AVERAGE TRAINING LEVEL	PERCENT OF COURSE
1. Weapon System Subjects	0	N/A	N/A
2. Observation of or Partic- ipation in Maintenance Tasks	0	N/A	N/A
3. Maintenance Management Subjects	113	69% B/31% C	72
4. Application of Mainte- nance Man- agement Principles	42	38% B/62% C	27
5. Other	3	A-B	1
TOTALS	158*	---	100
Reference: CTS C30BR4021 001 21 Dec 1981 POI C30BR4021 001 11 Jan 1982  *Technical Training--does not include testing or military training hours.			

FIGURE 3-16. Analysis of Course 30BR4021 001, Aircraft Maintenance Officer Accelerated

BASIC CATEGORY OF TRAINING	PERCENT OF COURSE					
	A MINUTEMAN BASIC	B MINUTEMAN ACCELERATED	C GLCM BASIC	D GLCM STAFF	E AMOC BASIC	F AMOC ACCELERATED
WEAPON SYSTEM SUBJECTS	30	30	22	56	24	N/A
OBSERVATION/ PERFORMANCE OF MAINT	42	48	48	19	N/A	N/A
MAINTENANCE MANAGEMENT SUBJECTS	20	15	22	8	44	72
APPLICATION OF MAINT MGT PRINCIPLES	5	6	3	0	30	27
OTHER	3	1	5	17	2	1
TOTAL	100	100	100	100	100	100

FIGURE 3-17. Training Emphasis as Percent of Instructional Hours--  
Missile and Aircraft Maintenance Officer Training  
Programs



The AMOC accelerated program devotes 100 percent of its time to management related topics as shown in Figure 3-17, Column F. While the GLCM Staff Course shown in Column D of Figure 3-17 was never designed to teach management subjects, the Minuteman accelerated program (Column B) only devotes a little less than one-fourth of its time to management subjects.

The point of this analysis is that the AMOC program is a "universal" aircraft management officer training system. Officers trained go to all MAJCOMs, in all aircraft weapon systems. Their programs, when compared to missile maintenance programs, do show an increased emphasis on management. Since basic maintenance management tasks are similar between missiles and aircraft, this emphasis offers a basic opportunity for improvement of missile maintenance programs in SAC and the TAF. The course objectives of both AMOC programs are detailed in Appendix C and show exactly how the AMOC program approaches the study of maintenance management.

#### Qualifications of Missile Maintenance Officer Instructors

Increasing the emphasis of maintenance management training is one basic opportunity to improve the quality of the missile maintenance officer training program. Is the missile maintenance officer instructor force (in ATC for SAC and TAC for the TAF) up to teaching the increased emphasis on management?

The author was a missile maintenance instructor at Chanute AFB, Illinois, in Courses 30BR3121G 005 and 006, Minuteman Missile Maintenance Officer (WS-133) for three and one-half years. One problem he faced as an instructor, especially when tasked to teach management subjects, was a complete lack of hard-core management experience in running a live maintenance organization (section or branch level) from which to draw on. The author was fortunate to personally interview the Chief of the Maintenance and Electronics Branch at Chanute whose responsibilities include overall management of the Minuteman missile maintenance officer courses. (This field grade, career missile maintenance officer also served with the author as an instructor in the early 1970s). In his opinion, the ability of Minuteman missile maintenance officer instructors to teach management subjects has not improved because the thrust of training continues to emphasize the technical aspects of the weapon system. (35:--) Further compounding this was an emphasis by SAC to develop their maintenance officers by having them personally supervise maintenance at missile sites through the Site Maintenance Officer Concept and Flight Officer Concept.\* (35:--)

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\*The Flight Officer Concept is now defunct after a SACMET study evaluating the use of officer manhours. (21:para 3)

It seems Minuteman maintenance officer instructors today may have the same handicap as former instructors when tasked to instruct maintenance management--a lack of hardcore experience. Indeed, SAC Pamphlet 35-3, Missile and Space Career Opportunity Text (MASCOT), which outlines the desired prerequisites for holding many missile jobs, states that missile maintenance instructors at the 3360th Technical Training Group require a minimum of only one year as a site maintenance officer. (11:7-12)

How does the experience level of GLCM missile maintenance officers compare? The OPR for the proposed GLCM Maintenance Officer Course (GMOC) plans to use two missile maintenance officers to conduct this program, one part-time and one full-time (the GMOC will also use a variety of operations officers and enlisted instructors). (18) These missile maintenance officers are captains and have six to eight years missile maintenance experience. (18) While the experience level of GMOC instructors may be higher than those at Chanute AFB, one wonders if the part-time nature of the instruction will allow the management aspect of missile maintenance officer instruction to bear fruit.

This section has established that two basic opportunities exist to improve missile maintenance officer training programs. One is to increase the emphasis on management subjects and their application. The AMOC program is one model which could be used. Another opportunity, concurrent with the first, is to boost the experience level of the missile maintenance officer instructor force. An important point is that these opportunities to improve the quality of training of missile maintenance officers exist regardless of whether missile maintenance officer training programs are combined or not.

#### SUMMARY OF THE ENVIRONMENT AND RANK ORDERING OF ENVIRONMENTAL CRITERIA

What is the environment of opportunity facing missile maintenance officer training programs? This chapter established five major opportunities:

- an opportunity for changing current and proposed missile maintenance officer training programs because they don't appear to meet SAC or the TAF expectations.
- an opportunity to combine training programs, especially with respect to the management of missile maintenance, because missile maintenance officer duties are similar in both SAC and the TAF.
- an opportunity for combining training programs because missile maintenance officers will be shared between SAC and the TAF at about a 20 percent rate.

- an opportunity to save money may exist if training programs were combined, although the savings will probably be of low magnitude.
- an opportunity to improve the quality of missile maintenance officer programs by increased emphasis on management study and increasing instructor experience levels in management areas.

These opportunities define the environment and can be expressed as criteria for measuring various training alternatives in Figure 3-18:

- Recognizes MAJCOM desires for more management emphasis
- Recognizes that 31XX duties/responsibilities are similar
- Offers money savings
- Recognizes that 31XXs will be shared
- Offers a way to improve training quality (in management and instructor experience)

FIGURE 3-18. Environmental Criteria

Before these can be used to measure various training alternatives, they must be prioritized, or weighted in importance one to another. Common sense dictates that all criteria may not be equal in importance. Also, by prioritizing criteria, differences in alternatives are more clearly expressed; one gets a sharper picture of the decision matrix process.

The relative order of merit the author favors appears as follows:

<u>CRITERION</u>	<u>POINT VALUE</u>
• Recognizes MAJCOM desires for more management emphasis	5
• Offers a way to improve training quality	4
• Recognizes that 31XX duties/responsibilities are similar	3
• Recognizes that 31XXs will be shared	2
• Offers money savings	1

FIGURE 3-19. Rank Ordering of Environmental Criteria

The rationale behind the author's order of merit is this: MAJCOM desires drive the entire training scenario and should be first in importance. Close behind is any opportunity to boost training quality. The author doesn't feel money savings in any combined training scenario will be of major importance and placed this consideration last. Recognition of similar duties and responsibilities and sharing of 31XXs naturally fell in between.

Some readers may object to this ordering of criteria. They should note their own ranking and prepare to apply it to the decision matrix in the next chapter. They can then see how their relative order of merit affects the decision process and determine if it caused an alternative to be chosen different from the author's decision process. This is one of the benefits of using a decision matrix format. It doesn't "make" decisions, but it does provide a destination and a road map to see how decisions are reached.

## Chapter Four

### A COMPARISON OF TRAINING ALTERNATIVES TO THE ENVIRONMENT

The purpose of this chapter is to compare the missile maintenance officer training alternatives discussed in Chapter Two with the environmental criteria established in Chapter Three. Figure 4-1 summarizes the four alternatives which will be evaluated:

1. <u>Maintain the Status-Quo</u>	<ul style="list-style-type: none"><li>• Chanute teaches Minuteman</li><li>• F. E. Warren teaches Peacekeeper to Chanute graduates</li><li>• GLCM gets experienced officers from SAC; 868 TMTS gives a quick orientation and sends to USAFE</li></ul>
2. <u>ATC and TAC teach separate courses</u>	<ul style="list-style-type: none"><li>• Chanute teaches Minuteman and adds a block for Peacekeeper</li><li>• 868 TMTS teaches staff orientation and proposed entry level course to new officers</li></ul>
3. <u>ATC teaches all systems in manner similar to Minuteman Program</u>	<ul style="list-style-type: none"><li>• Basically hardware oriented</li><li>• Student goes through only those blocks of instruction appropriate to his weapon system</li></ul>
4. <u>ATC teaches a universal or generic course</u>	<ul style="list-style-type: none"><li>• Management orientation vs weapon system</li><li>• Applicable to all commands</li></ul>

FIGURE 4-1. The Missile Maintenance Officer Training Alternatives

The overall product of this chapter will be a decision as to which of these alternatives best fits the environment and should be adopted. This will, of course, answer the question of whether a universal missile maintenance officer course should be pursued.

To accomplish the comparison, the author will consider each alternative in turn and evaluate its ability to satisfy each of the five criteria established in the last chapter. The following scale (as discussed in Chapter Two) will be used to measure how well each alternative fits the individual criterion:

<u>SCALE</u>	<u>NUMERICAL VALUE</u>
Does Not Fit	0.5
Partially Fits	1.0
Fits	1.5
Exceeds	2.0
Far Exceeds	2.5

FIGURE 4-2. Scale to Measure Training Alternatives

A numerical rating will be assessed each alternative based on the sum of its criteria effectiveness where:

- criterion effectiveness = criterion point value X how well the alternative fits the criterion

The higher numerical rating earned by an alternative training program, the more closely it matches the training environment.

After each alternative has been examined, all will be combined in a decision matrix model to summarize the results of the analysis.

#### EVALUATION OF ALTERNATIVE ONE: MAINTAIN THE STATUS-QUO

Alternative one means we continue to train officers just as we are doing right now. Figure 4-3 shows how the author ranked this alternative to each criterion. An explanation follows.

A	B	C	D	E
CRITERION	POINT VALUE	ALTERNATIVE SUITABILITY	SCALE	CRITERION EFFECTIVENESS (BXD)
1. Recognizes MAJCOM desires	5	Partially Fits	1.0	5.0
2. Improves training quality	4	Does Not Fit	0.5	2.0
3. Recognizes 31XX duties are similar among MAJCOMs	3	Does Not Fit	0.5	1.5
4. Recognizes 31XX sharing	2	Does Not Fit	0.5	1.0
5. Offers money savings	1	Partially Fits	1.0	1.0
ALTERNATIVE NUMERICAL RATING				10.5

FIGURE 4-3. Evaluation of Alternative One: Maintain the Status-Quo

With regard to criterion number one, earlier chapters established that TAF training desires aren't addressed by programs offered by Chanute. Also, SAC appears to be interested in pursuing a more management oriented approach to missile maintenance officer training. Nevertheless, because SAC does approve of the current training program, the author must conclude that maintaining the status-quo at least partially meets SAC desires (although perhaps not in the long term).

Criteria two, three and four are not satisfied by maintaining the status-quo. As Chapter Three brought out, current ATC training programs are conducted without regard for similarities in 31XX duties or sharing of 31XXs among commands. One must wonder

how long SAC can afford to provide experienced officers to the TAF. Further, ATC programs, through heavy emphasis on weapon systems hardware, and the lack of hard-core management experience by their instructor cadre, may not be able to provide an improvement in training quality regarding increased emphasis on management subjects.

Alternative one may offer a small savings in personnel costs since no further investment is made in producing a GLCM initial maintenance officer training course at the 868th TMTS. The inefficiencies generated by continually tapping the SAC manpower pool of experienced officers may, in the long run, be cost prohibitive.

#### EVALUATION OF ALTERNATIVE TWO: ATC AND TAC TEACH SEPARATE COURSES

As explained earlier, in this scenario ATC continues to teach its basic and accelerated Minuteman missile maintenance officer courses for those officers assigned to SAC. The TAF, however, establishes a separate program for new GLCM maintenance officer accessions, as modeled by the proposed TAC GLCM 3121C, GLCM Maintenance Officer Course. Figure 4-4 shows how the author compared this alternative to the training environment.

From Figure 4-4, one can see this scenario offers somewhat less than alternative one. Criteria three and four aren't met under this scenario for the same reasons provided under alternative one's evaluation--two separate programs fail to consider similarities in 31XX jobs across MAJCOMs or the fact that 31XXs will be jointly shared.

One would think, with the TAF conducting its own programs that criterion two could be rated higher (after all, a TAC goal is to increase emphasis on management and its application). But when the proposed TAC GLCM training program was analyzed, it stressed exactly the same things the ATC Minuteman programs stress--weapons system hardware. Thus a quality improvement isn't predicted. Further, while experience levels of TAC missile maintenance officer instruction might be somewhat higher than those at Chanute, these instructors may work only part-time as instructors. Competition for their time may degrade their effectiveness. Thus the author felt even with TAC conducting its own training, an increase in quality, as shown by prepared training programs, isn't likely.

Regarding criterion one, under alternative two SAC training desires continue to be partially met as they were under alternative one, since the ATC training programs remain the same in each of these two alternatives. But the proposed GLCM training



course which would be used in alternative two doesn't meet TAF desires for more management emphasis. Regardless of whether this proposed program were brought into agreement with TAF desires, SAC's training desires are only partially satisfied and a rating of "partially fits" must be applied.

A	B	C	D	E
CRITERION	POINT VALUE	ALTERNATIVE SUITABILITY	SCALE	CRITERION EFFECTIVENESS (BXD)
1. Recognizes MAJCOM desires	5	Partially Fits	1.0	5.0
2. Improves training quality	4	Does Not Fit	0.5	2.0
3. Recognizes 31XX duties are similar among MAJCOMs	3	Does Not Fit	0.5	1.5
4. Recognizes 31XX sharing	2	Does Not Fit	0.5	1.0
5. Offers money savings	1	Does Not Fit	0.5	0.5
ALTERNATIVE NUMERICAL RATING				10.0

FIGURE 4-4. Evaluation of Alternative Two: ATC and TAC Teach Separate Courses

Finally, a "doesn't fit" rating was given to this alternative for criterion five, cost savings, since the effect of having two training systems is to drive costs higher, not lower.

EVALUATION OF ALTERNATIVE THREE:  
ATC TEACHES ALL WEAPONS SYTEMS

The essence of this alternative is to place Minuteman, Peace-keeper and GLCM missile maintenance officer training under ATC and let them conduct the training along the lines they do now (weapon system hardware orientation). (Chapter Two and Figure 2-1 provide a more complete description.) The author sees the potential for such a combined system in this way:

A	B	C	D	E
CRITERION	POINT VALUE	ALTERNATIVE SUITABILITY	SCALE	CRITERION EFFECTIVENESS (BXD)
1. Recognizes MAJCOM desires	5	Partially Fits	1.0	5.0
2. Improves training quality	4	Partially Fits	1.0	4.0
3. Recognizes 31XX duties are similar among MAJCOMs	3	Fits	1.5	4.5
4. Recognizes 31XX sharing	2	Partially Fits	1.0	2.0
5. Offers money savings	1	Fits	1.5	1.5
ALTERNATIVE NUMERICAL RATING				17.0

FIGURE 4-5. Evaluation of Alternative Three: ATC Teaches All Weapons Systems

The mere fact of combining all missile maintenance training recognizes the shared nature of the 31XX resource and the similari-

ties in duties. A combined course offers cost savings of having only one course. These alone drive up the desirability of this alternative.

Because the alternative continues to stress the weapon system over management, the author could not conclude that this alternative really captures the essence of increased management emphasis (thus a "partially fits" rating in criterion one). However, because the instructor cadre will likely have instructors experienced in multiple weapon systems, the author feels their experience level will be higher, especially in the management area. The management subjects that are taught will be taught better and in more depth than they are now. Therefore, this alternative has a positive influence on improving the quality of management training, even though it may stress weapon system hardware subjects over management.

#### EVALUATION OF ALTERNATIVE FOUR: ATC TEACHES THE UNIVERSAL OR GENERIC COURSE

The universal missile maintenance officer course proposal is a combined missile maintenance officer training system like alternative three except its emphasis is on management subjects and their application to maintenance. The weapon system and its hardware only receive enough emphasis to provide a background to properly conduct the management aspects of the course. The unique aspects of a particular weapon system's hardware would be presented in follow-on training at each unit or would be obtained on-the-job as a part of working with the system. The author's examination of this alternative to the environment is as follows:

A	B	C	D	E
CRITERION	POINT VALUE	ALTERNATIVE SUITABILITY	SCALE	CRITERION EFFECTIVENESS (BXD)
1. Recognizes MAJCOM desires	5	Fits	1.5	7.5
2. Improves training quality	4	Fits	1.5	6.0
3. Recognizes 31XX duties are similar among MAJCOMs	3	Exceeds	2.0	6.0
4. Recognizes 31XX sharing	2	Fits	1.5	3.0
5. Offers money savings	1	Fits	1.5	1.5
ALTERNATIVE NUMERICAL RATING				24.0

FIGURE 4-6. Evaluation of Alternative Four: The Universal Missile Maintenance Officer Course

The author rated this alternative one-half point more for almost all criteria than he did for alternative three for these reasons. Concerning criterion one (MAJCOM desires), a universal course hits the nail on the head--its sole purpose is to stress management. This is why a "fits" suitability rating was given. Similarly, the universal course, because it meets MAJCOM desires is likely to improve the quality of instruction through increased management emphasis and a higher experience level of instructors in management. The author believes a commitment to this proposal must drive up management emphasis (the rationale for the course in the first place) and similarly drive up instructor experience to teach the course. Because the demands of the course will be

higher, a more qualified (i.e., experienced) instructor is required, probably having at least two maintenance officer tours (i.e., 6-8 years experience). The author feels this experience level is easier to attain by approaching training from the universal route, as each MAJCOM could better afford to put its top people into these slots. In many instances, it seems training is given a back seat in the maintenance world. A universal course, supported by the three using commands and ATC might keep this from happening.

Criterion three received an "exceeds" rating primarily because the universal course stresses management much more than the combined course (alternative three). It recognizes much better the similarities of duties between 31XXs in each MAJCOM which are largely management related.

The universal course recognizes the shared nature of the 31XX resource better than any proposal. Inherent in its approach is that a missile maintenance officer attends one course and is then eligible for worldwide missile maintenance duty. While alternative three (the combined training program) could provide a "one-stop maintenance course," its lack of management emphasis means it probably would do this less efficiently than the universal course.

Because both alternatives three and four can be "one-stop" training courses, the author felt the cost savings ability of alternative four should be rated no higher than alternative three (even though the universal course will be specifically designed as a "one-stop" training program). The author thus awarded a "fits" score to the universal course for its ability to save money.

#### A DECISION MATRIX MODEL AND SUMMARY

Figure 4-7 summarizes the evaluation of these four training alternatives as depicted in Figures 4-3 through 4-6:

ENVIRONMENTAL CRITERIA	ALTERNATIVE EFFECTIVENESS			
	1	2	3	4
	Maintain Status Quo	ATC and TAC Teach Separate Courses	ATC Teaches A Combined Course	ATC Teaches A Universal Course
1. Recognizes MAJCOM Training Desires	P. Fits 5.0	P. Fits 5.0	P. Fits 5.0	Fits 7.5
2. Improved Quality of Training	Does Not Fit 2.0	Does Not Fit 2.0	P. Fits 4.0	Fits 6.0
3. Recognizes 31XX duties are similar among MAJCOMs	Does Not Fit 1.5	Does Not Fit 1.5	Fits 4.5	Exceeds 6.0
4. Recognizes 31XX sharing	Does Not Fit 1.0	Does Not Fit 1.0	P. Fits 2.0	Fits 3.0
5. Offers Money Savings	P. Fits 1.0	Does Not Fit 0.5	Fits 1.5	Fits 1.5
TOTAL POINTS	10.5	10.0	17.0	24.0

FIGURE 4-7. A Decision Matrix Model Summary of Alternative Evaluations

Given the environmental criteria that have been developed in Chapter Three, Figure 4-7 shows alternative four, the universal or generic missile maintenance officer course, best meets these criteria. Further, the model suggests alternative three,

a combined missile maintenance course, would be next in desirability followed by no action (the status-quo) and finally having ATC and TAC develop separate training programs.

This model supports the establishment of a universal missile maintenance course as proposed by HQ TAC (specifically Captains Jim Davidson and Jim Johnson). The marginally higher rating of doing nothing to ATC and TAC developing separate programs is not meaningful enough to really draw a conclusion. However, depending upon the ability of SAC to provide experienced 31XX resources to the TAF, doing nothing might be the most effective short term course of action, especially if the universal course is perceived as rapidly gaining favor for implementation by SAC and ATC.

## Chapter Five

### FINDINGS AND RECOMMENDATIONS

#### FINDINGS

This author finds:

a. The MAJCOMs (SAC, TAC and USAFE) desire more emphasis in maintenance management and its application in their training programs.

b. The current missile maintenance officer training programs of ATC and a proposed maintenance officer training program by the 868th TMTS for TAC don't match the MAJCOM desires. These programs emphasize weapon system hardware over management subjects by three to one.

c. While Minuteman, Peacekeeper and GLCM differ from each other as weapon systems, the duties and responsibilities of missile maintenance officers managing the maintenance of these systems are very similar. This is evidenced by similar maintenance organizational structures, manning and maintenance regulations.

d. An imbalance in GLCM maintenance manning overseas versus the CONUS guarantees that in a maintenance career, officers will be shared between SAC and the TAF. A career missile maintenance officer may now expect at least one overseas assignment as a 31XX.

e. If maintenance officer courses were combined, some savings in personnel costs would likely be realized, although the magnitude would be relatively small (i.e., in the lower 5-digit figure spectrum per year). Cost savings are difficult to predict for training proposals such as the universal course, but are not expected to be a major decision factor.

f. Maintenance officer training programs of a related maintenance career field (aircraft maintenance) emphasize maintenance management subjects over weapon system hardware subjects by a three to one ratio. This is exactly opposite to what missile maintenance officer training programs emphasize. Missile maintenance officer programs could use the aircraft maintenance officer approach to increase the qualifications for teaching these



subjects). This action could be done regardless of any decision to combine training programs or start a universal course.

g. The universal or generic missile maintenance officer course, as proposed by Captains Davidson and Johnson of HQ TAC, best meets the missile maintenance training environment. The universal course has the potential to best meet MAJCOM desires to emphasize management, recognize the similarities of 3lXX duties and the extent of sharing among MAJCOMs, save money and increase the quality of training.

#### RECOMMENDATIONS

The author recommends that ATC, TAC, SAC and USAFE training representatives develop a universal missile maintenance program patterned after the Aircraft Maintenance Officer Courses. The key goal is to put emphasis on "missile maintenance officer, the leader/manager" instead of "missile maintenance officer, the technician/supervisor." Realization of this goal is going to be tough and plagued by attempts to "take the easy way out." The missile maintenance community has been taking the easy way for a long time by stressing hardware. Perhaps now, the time is right for a new approach. Good luck.

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28. U.S. Air Force Tactical Air Command. Headquarters TAC/LGWLG, Langley AFB, Virginia. Minutes of TAF/ATC GLCM Maintenance Training Conference, 1-2 November 1982, 7 December 1982.
29. Weideman, Robert F., Major, USAF. Deputy Director, Ground Launched Missile Maintenance, USAFE/LGB, Ramstein AB, Germany. Letter to author on Universal Missile Maintenance Course, 8 November 1983.
30. Woner, James M., Colonel, USAF. Commander, 868 Tactical Missile Training Squadron, Davis-Monthan AFB, Arizona. Letter to HQ TAC/LGW, "GLCM Maintenance Officer Course," 12 October 1983.

### Other Sources

31. Brutcher, Bruce, Captain, USAF. 3360th Technical Training Group/TTEM, Chanute AFB, Illinois, Telecon, 5 December 1983.
32. Flood, Stewart, Captain, USAF. Headquarters ATC/TTQL, Randolph AFB, Texas. Telecon Interview, 8 September 1983.
33. O'Brien, James J., III, Major, USAF. Headquarters SAC/LGBA, Offutt AFB, Nebraska. Telecon Interview, 12 December 1983.
34. O'Brien, James J., III, Major, USAF. Headquarters SAC/LGBA, Offutt AFB, Nebraska. Telecon Interview, 26 September 1983.
35. Ramsey, Nedon, Major, USAF. ACSC Student and former Chief, Missile Maintenance/Electronics Branch, 3360 Technical Training Group/TTEM, Chanute AFB, Illinois. Personal interview with author, Maxwell AFB, Alabama, 12 January 1984.

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### B. RELATED SOURCES

#### Official Documents

U.S. Air Force Strategic Air Command. SAC Additional Duty Career Development Program (ADSAC) ICBM Maintenance. SACP 36-10, Vol. XIII, Offutt AFB, Nebraska, 17 March 1978.

#### Unpublished Materials

Kornreich, James E., Major, USAF. "The Changing Role of the Minuteman Missile Maintenance Officer." Research paper, Air University, Maxwell Air Force Base, Alabama, 1979.

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# APPENDIX

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## A

UNIVERSAL MISSILE MAINTENANCE OFFICER  
COURSE TRAINING STANDARD\*

DEPARTMENT OF THE AIR FORCE  
Headquarters Tactical Air Command  
Langley Air Force Base, Virginia 23665

CTS TAC  
(PDS Code )  
Date:

MISSILE MAINTENANCE OFFICER

1. Purpose. This course training standard as prescribed in AFM 50-2.
    - a. Establishes the tasks, knowledge, and proficiency level of training to be provided by Course TAC GLCM ??? Missile Maintenance Officer.
    - b. Provides the basis for the development of more detailed training materials, objectives and training evaluation instruments for the course.
  2. Course Description. The course covered by this standard is designed to provide training for Air Force officers entering the missile maintenance field without regard for background or prior skills or training other than specified by AFM 50-5. Graduates perform as Missile Maintenance officers, DAFSC 3121C, in world-wide assignments. Scope of training includes technical familiarization covering basics of missile systems in addition to managerial skills in communication, problem solving, management systems, organization and personnel management.
- NOTE: Trainees entering this course at a level below that specified in AFM 50-5 or other established prerequisites, cannot be expected to achieve the levels indicated.
3. Qualitative Requirements. Attachment 1 contains the list of tasks, knowledges, and proficiency referenced in paragraph 1.
  4. Recommendations. Comments and recommendations are invited concerning quality of TAC training and graduates. Use this CTS as a reference and address correspondence to HQ TAC/LGWM, Langley AFB, VA 23665.

OFFICIAL

1 Atch

Qualitative Requirements

\*Author's note: This CTS accompanied all proposals for a universal course. Although proposed under a TAC GLCM course format it intends to be an approach useful for all missile systems. Paragraph 1.a. above ??? signifies that Captains Davidson and Johnson intended this to apply to all systems.

Number of Printed Pages:

OPR: HQ TAC/LGWM OPDR: 868 TMTS/TTM  
Approved by: Colonel James M. Woner  
Writer-Editor: Captain James S. Johnson  
Distribution: X

OPR & Approval Data:  
DISTRIBUTION:



## QUALITATIVE REQUIREMENTS

PROFICIENCY CODE KEY	
TASK  PERFORMANCE  LEVELS	1. Can do simple parts of the task. Needs to be told or shown how to do most of the task.
	2. Can do most parts of the task. Needs help on hardest parts. May not meet demands for speed and accuracy.
	3. Can do all parts of the task. Systematically accomplishes tasks without errors that affect task outcome.
	4. Can do the task quickly and accurately without errors that affect task outcome. Student's rapid response is required, due to critical nature and/or time sensitivity of task.
TASK  KNOWLEDGE  LEVELS	a. Can name parts, tools, and simple facts about the task.
	b. Can name the steps in doing the task and tell how each is done. Can handle simple, straight-forward task. Needs assistance to handle abnormal indications.
	c. Can explain why and when the task must be done and why each step is needed. Can transition from one task to another if indications require it.
	d. Can identify and resolve problems about the task. Can extrapolate and interpret unrelated items to resolve problems.
SUBJECT  KNOWLEDGE  LEVELS	A. Can identify basic facts and terms about the subject.
	B. Can explain relationship of basic facts and state general principles about the subject.
	C. Can analyze facts and principles and draw conclusions about the subject.
	D. Can evaluate conditions and make proper decisions about the subject.

GLCM  
MAINTENANCE OFFICER TRAINING

Course Training Standard

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Tasks, Knowledge, and Proficiency Level

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- |   |    |
|---|----|
| 1. Weapon System Fundamentals                 | B  |
| a. Missions and deployment                    |    |
| b. Missile systems                            |    |
| (1) Propulsion system                         | B  |
| (2) Guidance systems                          | B  |
| (3) Payload                                   | B  |
| (4) Facilities                                | B  |
| (5) Communications system                     | B  |
| (6) Security systems                          | B  |
| (7) Weapons system modifications              | B  |
| (8) Hardness assurance program                | A  |
| (9) Preventive maintenance concept            | B  |
| (10) Introduction to missile maintenance      | B  |
| 2. Maintenance Management                     |    |
| a. AFR 66-1                                   | B  |
| b. Basic organization                         | B  |
| c. Principles of management                   | B  |
| (1) Management theories                       | B  |
| (2) Legal aspects of military management      | B  |
| (3) Human element of management               | B  |
| (4) Participate in maintenance management lab | 2b |
| 3. Communication Techniques                   |    |
| a. Prepare and present maintenance briefing   | 2b |

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### Tasks, Knowledge, and Proficiency Level

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b. Prepare maintenance operating instructions	2b
c. Principles of counseling	B
4. AF Standard Publications Systems	
a. Standard Publications	B
b. Technical order system	B
c. Use of Technical data	2b
d. Technical order improvement system	B
e. AF Forms	B
f. Maintenance forms	
(1) Format and documentation	B
(2) Audit and analysis	B
5. Security	
a. Communications security (COMSEC)	
(1) Classification of information	B
(2) Prevention of security violations	B
b. Operations security (OPSEC)	
(1) Definition of OPSEC	A
(2) History of OPSEC	A
(3) Relationships of OPSEC to other security programs including COMSEC, information security and physical security	A
(4) Common OPSEC vulnerabilities	A
(5) OPSEC significance of unclassified data and procedures	A
(6) Specific vulnerabilities of 3121 AFSC	B
6. Safety	
a. Explosive	B

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**Tasks, Knowledge, and Proficiency Level**

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- b. Nuclear
  - (1) Two man control B
  - (2) No lone zone/PRP B
- c. Missile B
- d. Ground
  - (1) USAF hazard reporting B
  - (2) International driving B
- e. Weapon systems hazards B
- 7. Personnel
  - a. Officer classification and management systems A
  - b. Airman classification and management systems A
  - c. Civilian classification and management systems A
  - d. Manpower resources management B
- 8. USAF Supply System
  - a. Organization A
  - b. Procedures B
  - c. Supply/maintenance interface B
  - d. Depot supply system
    - (1) Air Logistics Center concepts A
    - (2) Air Logistics Center functions A
- 9. USAF Transportation System
  - a. Organization A
  - b. Procedures
    - (1) Vehicle maint management A
    - (2) Logistics Transportation System A

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**Tasks, Knowledge, and Proficiency Level**

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- |   |   |
|---|---|
| 10. Air Force Inspection System                                 |   |
| a. IG complaint system  | A |
| b. Readiness inspections  | B |
| c. Management effectiveness inspections                         | B |
| 11. Financial Management  |   |
| a. USAF budget process  | A |
| b. Base financial management                                    | B |
| 12. USAF Training Programs                                      |   |
| a. Technical training   | B |
| b. Field training detachments                                   | B |
| c. Special training   | B |
| d. On-the-job training  | B |
| 13. Material Deficiency Reporting Systems                       |   |
| a. Material Deficiency Reports                                  | B |
| b. Service reports  | B |
| c. Report of discrepancy  | A |
| d. Product Improvement reports                                  | A |
| 14. Preventative Maintenance Programs                           |   |
| a. Non-destructive inspection programs                          | B |
| b. Corrosion Control  | B |
| c. Depot PDM Programs   | A |
| 15. UCMJ  |   |
| a. Purpose  | A |
| b. Procedures   | B |
| 16. Responsibilities of Maintenance Activities and Organization |   |

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Tasks, Knowledge, and Proficiency Level

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a. MAJCOM and unit	A
b. The missile wing staff	B
c. Deputy commander for maintenance and staff agencies	B
d. Missile maintenance squadrons	B
e. Field missile maintenance squadrons	B
f. Organizational missile maintenance squadrons	B
g. Tactical missile maintenance squadrons	B
h. Base missile support functions	B
i. Maintenance management information and control system (MMICS)	A
j. GLCM Maintenance Management information control system (GMICS)	A

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# APPENDIX

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**B**

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

Course Training Standard: CTS C30BR3121G 005 18 Nov 1982 (tentative) POI: C30BR3121G 005 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block I:						
Orientation	1.a.,b.,c.	Other	4	N/A		None
Basic facts/principles of weapon systems mission/deployment	2.a.	W.S.	8	B		6.e.
Basic facts/terms about weapon system modifications	2.b.	W.S.	6	A		6.f.
Basic facts/principles of hardness assurance program	2.c.	W.S.	7	B		6.g.
Basic facts/principles of preventive maintenance concept	2.d.	Maint Mgt	7	B		6.h.
Basic facts/principles of communications systems	2.e.	W.S.	6	B		6.d.
Basic facts/principles of standard publications	3.a.	Maint Mgt	6	B		5.a.
Basic facts/principles of SAC publications	3.b.	Maint Mgt	6	B		5.b.
Basic facts/principles of technical order system	3.c.	Maint Mgt	8	B		5.c.
Missile safety	4.a.	Maint Mgt	4	B		4.a.
Nuclear safety	4.b.	Maint Mgt	2	B		4.c.
Protective clothing/safety equipment	4.c.	Maint Mgt	2	B		4.b.
OPSEC	5.a.	Other	4	A		3.b.
COMSEC	5.b.	Other	4	B		3.c.

Add 2 hours testing



MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133      WEAPON SYSTEM: Minuteman  
COURSE NUMBER: C30BR3121G 005      TOTAL HOURS: (Technical Trng) 498  
Course Training Standard: CTS C30BR3121G 005 18 Nov 1982 (tentative)      POI: C30BR3121G 005 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block II: Basic facts about safety as related to electronics Describe principles of direct current General principles of multimeter operation Principles of alternating current Soft support building entry and exit procedures Perform LF entry and exit Determine LF hardware inspection procedures LF lock out procedures Determine correct emergency shutdown procedures Participate in combination lock change Describe general principles/functions of security systems Participate in security systems checkout	1.a.	W.S.	4	B		9.d.
	1.b.	W.S.	12	B		9.a.
	1.c.	W.S.	8	B		9.c.
	1.d.	W.S.	6	B		9.b.
	3.a.	OBSERV/P	4		2b	8.a.(1)
	3.b.	OBSERV/P	8		2b	8.a.(1)
	3.c.	OBSERV/P	4	b	1b	8.a.(7)
	3.d.	OBSERV/P	3			8.c.(12)
	3.e.	OBSERV/P	2			8.a.(2),
	3.f.	OBSERV/P	3	b	1b	(3),(4) 8.c.(11)
Block III: Describe functions of LF and LCF AGE and RPIE Inspect and operate diesel electrical unit Participate in standby power system maint tasks Participate in battery maintenance tasks	4.a.	W.S.	6	B	1b	6.c.
	4.b.	OBSERV/P	6			8.c.(10)
	1.a.	W.S.	7	B		6.a./
	1.b.	OBSERV/P	2		2b	6.b. 8.a.(5)
	1.c.	OBSERV/P	2		1b	8.b.(2)
	1.d.	OBSERV/P	1		1b	8.c.(9)
						(a)

Add 4 hours testing

Add 2 hours testing

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

Course Training Standard: CTS C30BR3121G 005 18 Nov 1982 (tentative) POI: C30BR3121G 005 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: (Continued)						
Participate in LF battery maintenance	1.e.	OBSERV/P	5		1b	8.c.(9)(a)
Determine procedures for LCF battery maint	1.f.	W.S.	2	b		8.c.(9)(b)
Determine procedures for LCF motor generator maint	1.g.	W.S.	2	b		8.c.(4)
Participate in LF motor generator maint procedures	1.h.	OBSERV/P	3		1b	8.c.(3)
Participate in removal/replacement of LF motor generator	1.i.	OBSERV/P	5		1b	8.c.(3)
Participate in LCF distribution box maint tasks	1.j.	OBSERV/P	4		1b	8.c.(2)
Participate in LCF power supply group maint tasks	1.k.	OBSERV/P	4		1b	8.c.(8)
Participate in LF distribution box maint tasks	1.l.	OBSERV/P	8		1b	8.c.(2)
Participate in LF distribution box repair	1.m.	OBSERV/P	6		1b	8.c.(2)
Participate in LF power fault to ground replacement	1.n.	OBSERV/P	4		1b	8.c.(13)
Participate in LF battery charger removal/replacement	1.o.	OBSERV/P	3		1b	8.c.(7)
Determine operational functions of LF and LCF AGE	2.a.	W.S.	14	B		6.a.
Determine environmental control system restart procedures	2.b.	W.S.	2	b		8.a.(6)
Perform selected environmental control system maint tasks	2.c.	OBSERV/P	14		2b	8.b.(1)

Add 2 hours testing

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

Course Training Standard: CTS C30BR3121G 005 18 Nov 1982 (tentative) POI: C30BR3121G 005 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: (Continued)						
Participate in selected guidance and control system maint tasks	2.d.	OBSERV/P	6		1b	8.c.(5)
Determine maint procedures for LF sump pump	3.a.	W.S.	1	b		8.b.(3)
Block IV:						
State principles of LCF command and control	1.a.	W.S.	16	B		6.a.(3)
State principles of LCF operational ground equipment functions	1.b.	W.S.	14	B		6.a.(1)
Participate in LCC console maintenance	2.a.	OBSERV/P	8		1b	8.c.(6)
Participate in electronic drawer maintenance	2.b.	OBSERV/P	14		1b	8.c.(1)
State principles of LF aerospace vehicle equipment	4.a.	W.S.	5	B		6.b.(2)
State principles of LF aerospace ground equipment	4.b.	W.S.	16	B		6.b.(1)
Participate in missile startup/shutdown	5.a.	OBSERV/P	8		1b	8.c.(14)
Participate in tape loading	5.b.	OBSERV/P	8		1b	8.c.(15)
Participate in data control unit memory overwrite	5.c.	OBSERV/P	4		1b	8.c.(16)
Participate in command signal decoder code change	5.d.	OBSERV/P	4		1b	8.c.(17)
State principles of classification of code components	5.e.	W.S.	2	B		3.a.(1)
State principles of code component control	5.f.	W.S.	2	B		3.a.(2)

Add 2 hours testing

Add 4 hours testing

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

Course Training Standard: CTS C30BR3121G 005 18 Nov 1982 (tentative) POI: C30BR3121G 005 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
<p>Block V:</p> <p>Identify facts about processing missiles from depot to silo</p> <p>Explain facts/principles of handling missile guidance set, propulsion system rocket engine and reentry system</p> <p>Explain principles of ground handling equipment</p> <p>Explain facts about transportation team chief duties</p> <p>Explain facts about missile removal/replacement and equipment</p> <p>Participate in installing/removing elevator workage</p> <p>Participate in missile suspension system operation and maintenance tasks</p> <p>Participate in removal/replacement of Post Boost Vehicle</p> <p>Participate in operation/maintenance of launcher closure door</p> <p>Determine procedures for wet missile inspection</p>	1.a.	W.S.	1	A		7.a.
	1.b.	W.S.	1	B		7.b.
	1.c.	W.S.	1	B		7.c.
	1.d.	Maint Mgt	1	B		7.d.(1)
	1.e.	W.S.	5	B		7.e.
	2.a.	OBSERV/P	8		1b	8.d.(1)
	3.a.	OBSERV/P	14		1b	8.d.(3)
	4.a.	OBSERV/P	32		1b	8.d.(5)
	5.a.	OBSERV/P	10		1b	8.d.(4)
	6.a.	W.S.	1	b		8.d.(2)

Add 2 hours testing

Add 3 hours testing

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

**WEAPON SYSTEM: Minuteman**

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

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CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block VI: Identify basic facts about organization/responsibilities of USAF and SAC Describe organization/responsibilities of: Missile wing staff Base missile support function Deputy commander for maintenance/staff Field missile maintenance squadron Organizational missile maintenance squadron Maintenance officer duties/responsibilities Emergency War Order functions of maintenance Describe purpose of these maintenance activities	1.a. 1.b.	Maint Mgt	2	A		1.a. 1.b. 1.b. 1.f. 1.c. 1.d.
		Maint Mgt	2	B		
		Maint Mgt	2	B		
		Maint Mgt	16	B		
		Maint Mgt	2	B		
		Maint Mgt	2	B		
		Maint Mgt	2	B		1.e.
		Maint Mgt	2	B		1.g.
		Maint Mgt	2	B		1.m.
	1.c.	Maint Mgt	2	B		1.h.
		Maint Mgt	2	B		1.i.
		Maint Mgt	2	B		1.l.
	2.a.	Application	3		2b	1.j.
	2.b.	Maint Mgt	3	B		1.1.
	3.a.	Maint Mgt	8	B		1.k.
	4.a.	Application	7		2b	1.n.

MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133

WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 005

TOTAL HOURS: (Technical Trng) 498

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CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block VI: (Continued) Construct a maintenance plan (day/week/month) Direct and control maint resources to accomplish mission Describe the legal aspects of military management Describe the human elements of management Discuss USAF graduate evaluation program	4.b.	Application	7		2b	1.n.
	4.c.	Application	7		2b	1.n.
	5.a.	Maint Mgt	8	B		2.a.(1)
	5.b.	Maint Mgt	8	B		2.a.(2)
	6.a.	Other	1	A		10

Add 3 hours testing

MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman  
COURSE NUMBER: C30BR3121G 006 TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30BR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block II: Orientation Basic facts about safety as related to electronics Describe principles of direct current General principles of multimeter operation Principles of alternating current Soft Support building entry and exit procedures Perform LF entry and exit Determine LF hardware inspection procedures LF lockout procedures Determine current emergency shutdown procedures Participate in combination lock change Describe general principles/functions of security system Participate in security system checkout	1.a. 1.a. 1.b. 1.c. 1.d. 3.a. 3.b. 3.c. 3.d. 3.e. 3.f. 4.a. 4.b.	Other  W.S. W.S. W.S. W.S.  OBSERV/P OBSERV/P OBSERV/P OBSERV/P  OBSERV/P OBSERV/P  W.S. OBSERV/P	4 4 12 8 6 4 8 4 3 2 3 6 6	N/A  B B B B  b b  b  B	      2b  1b  1b  1b	None 9.d. 9.a. 9.c. 9.b.  8.a.(1) 8.a.(1) 8.a.(7) 8.c.(12) 8.a.(2), (3),(4) 8.c.(11)  6.c. 8.c.(10)
Block III: Describe functions of LF and LCF AGE and RPIE Inspect and operate the diesel electrical unit	1.a. 1.b.	W.S. OBSERV/P	7 2	B	2b	6.a./ 6.b. 8.a.(5)

MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 006

TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30BR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: (Continued)						
Participate in standby power system maint tasks	1.c.	OBSERV/P	2		1b	8.b.(2)
Participate in battery maint tasks	1.d.	OBSERV/P	1		1b	8.c.(9)
Participate in LF battery maint	1.e.	OBSERV/P	5		1b	8.c.(9)(a)
Determine procedures for LCF battery maint	1.f.	W.S.	2	b		8.c.(9)(b)
Determine procedures for LCF motor generators maint	1.g.	W.S.	2	b		8.c.(4)
Participate in LF motor generator maint procedures	1.h.	OBSERV/P	3		1b	8.c.(3)
Participate in removal/replacement of LF motor generator	1.i.	OBSERV/P	5		1b	8.c.(3)
Participate in LCF distribution box maint tasks	1.j.	OBSERV/P	4		1b	8.c.(2)
Participate in LCF power supply group maint tasks	1.k.	OBSERV/P	4		1b	8.c.(8)
Participate in LF distribution box maint tasks	1.l.	OBSERV/P	8		1b	8.c.(2)
Participate in LF distribution box repair	1.m.	OBSERV/P	6		1b	8.c.(2)
Participate in LF power fault to ground	1.n.	OBSERV/P	4		1b	8.c.(13)
Participate in LF battery charger removal/replacement	1.o.	OBSERV/P	3		1b	8.c.(7)



MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman  
COURSE NUMBER: C30BR3121G 006 TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30RR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: (Continued)						
Determine operational functions of LF and LCF AGE	2.a.	W.S.	14	B		6.a.
Determine environmental control system restart procedures	2.b.	W.S.	2	b		8.a.(6)
Performs selected environmental control system maint tasks	2.c.	OBSERV/P	14		2b	8.b.(1)
Participate in selected guidance and control system maint tasks	2.d.	OBSERV/P	6		1b	8.c.(5)
Determine maint procedures for LF sump pump	3.a.	W.S.	1	b		8.b.(3)
Block IV:						
State principles of LCF command and control	1.a.	W.S.	16	B		6.a.(3)
State principles of LCF operational ground equipment functions	1.b.	W.S.	14	B		6.a.(1)
Participate in LCC console maint	2.a.	OBSERV/P	8		1b	8.c.(6)
Participate in electronic drawer maint	2.b.	OBSERV/P	14		1b	8.c.(1)
State principles of LF aerospace vehicle equipment	4.a.	W.S.	5	B		6.b.(2)
State principles of LF aerospace ground equipment	4.b.	W.S.	16	B		6.b.(1)
Participate in missile startup/shutdown	5.a.	OBSERV/P	8		1b	8.c.(14)
Participate in tape loading	5.b.	OBSERV/P	8		1b	8.c.(15)
Participate in data control unit memory overwrite	5.c.	OBSERV/P	4		1b	8.c.(16)

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 006

TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30BR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block IV: (Continued)						
Participate in command signal decoder code change	5.d.	OBSERV/P	4		1b	8.c.(17)
State principles of classification of code components	5.e.	W.S.	2	B		3.a.(1)
State principles of code component control	5.f.	W.S.	2	B		3.a.(2)
Block V:						
Identify facts about processing missiles from depot to silo	1.a.	W.S.	1	A		7.a.
Explain facts/principles of handling missile guidance set, propulsion system rocket engine and reentry system	1.b.	W.S.	1	B		7.b.
Explain principles of ground handling equipment	1.c.	W.S.	1	B		7.c.
Explain facts about transportation team chief duties	1.d.	Maint Mgt	1	B		7.d.(1)
Explain facts about missile removal/replacement and equipment	1.e.	W.S.	5	B		7.e.
Participate in installing/removing elevator workage	2.a.	OBSERV/P	8		1b	8.d.(1)
Participate in missile suspension system operations and maint tasks	3.a.	OBSERV/P	14		1b	8.d.(3)
Participate in removal/replacement of Post Boost Vehicle	4.a.	OBSERV/P	32		1b	8.d.(5)

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 006

TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30BR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block V: (Continued)						
Participate in operation/maint of launcher closure door	5.a.	OBSERV/P	10		1b	8.d.(4)
Determine procedures for wet missile inspection	6.a.	W.S.	1	b		8.d.(2)
Block VI:						
Identify basic facts about organization/responsibilities of USAF and SAC	1.a.	Maint Mgt	2	A		1.a.
Describe organization/responsibilities of: Missile wing staff	1.b.	Maint Mgt	2	B		1.b.
Base missile support function		Maint Mgt	2	B		1.b.
Deputy commander for maint/staff		Maint Mgt	16	B		1.f.
Field missile maint squadron		Maint Mgt	2	B		1.c.
Organizational missile maint squadron		Maint Mgt	2	B		1.d.
Maintenance officer duties/responsibilities		Maint Mgt	2	B		1.e.
Emergency War Order functions of maint		Maint Mgt	2	B		1.j.
Describe purpose of these maint activities	1.c.	Maint Mgt	2	B		1.m.
Maint Mgt Information and Control System		Maint Mgt	2	B		1.h.
Maint Data Analysis System		Maint Mgt	2	B		1.k.
Maint Dispatch Data Documentation		Maint Mgt	2	B		1.i.
Complete an AFTO form 349 and AFTO form 350	2.a.	Application	3	B	2b	1.l.
Describe principles of Maint Dispatch Data Collection System	2.b.	Maint Mgt	3	B		1.j.
						1.l.

MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: Minuteman Missile Maintenance Officer WS-133 (Accelerated) WEAPON SYSTEM: Minuteman

COURSE NUMBER: C30BR3121G 006

TOTAL HOURS: 428

Course Training Standard: CTS C30BR3121G 006 18 Nov 1982 (tentative) POI: C30BR3121G 005/  
C30BR3121G 006 11 Mar 1983

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block VI: (Continued) Identify basic facts/terms about the supply system Construct a schedule to meet availability requirements Construct a maint plan (day/week/month) Direct and control maint resources to accomplish mission Describe the legal aspects of military management Describe the human elements of management Discuss USAF graduate evaluation program	3.a.	Maint Mgt	8	B		1.k.
	4.a.	Application	7		2b	1.n.
	4.b.	Application	7		2b	1.n.
	4.c.	Application	7		2b	1.n.
	5.a.	Maint Mgt	8	B		2.a.(1)
	5.b.	Maint Mgt	8	B		2.a.(2)
	6.a.	Other	1	A		10

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: GLCM Maintenance Officer Course  
(Proposed)

WEAPON SYSTEM: Ground Launched Cruise Missile  
(GLCM)

COURSE NUMBER: TAC GLCM 3121C

TOTAL HOURS: 209

Course Training Standard: CTS TAC GLCM 3121C  
1 Sep 83 (Draft)

Course Outline: TAC GLCM 3121C  
1 Sep 83 (Draft)

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Inprocessing	Day 0	Other	6.0	N/A		N/A
Course overview	Day 1	Other	1.0	N/A		N/A
Operations concept	Day 1	W.S.	2.0	B		1.a.
Logistics concept	Day 1	Maint Mgt	2.0	B		1.b.
Security concept	Day 1	W.S.	1.0	B		1.c.
GLCM Program overview	Day 2	W.S.	1.0	A		2.a.
All-up-round (AUR)	Day 2	W.S.	1.0	B		2.b.
Transporter Erector Launcher (TEL)	Day 2	W.S.	1.0	B		2.c.
Launch Control Center (LCC)	Day 2	W.S.	1.5	B		2.d.
Flight Vehicle	Day 2	W.S.	1.0	B		2.f.
VHF Communication Relay	Day 2	W.S.	1.0	B		2.e.
Operational Equipment Tour	Day 3	W.S.	2.0	N/A		2.a-e.
Theater Mission Planning	Day 3	W.S.	1.0	A		1.d.
GLCM Threat Briefing	Day 3	W.S.	1.5	A		3.a.
European Environment	Day 3	W.S.	1.5	A		3.b.
NATO operation	Day 4	W.S.	2.0	A		3.c.
GLCM training programs	Day 4	Other	1.0	B		2.g.
Dispersal operations	Day 4	W.S.	3.0	B		4.a.
Missile Procedures Trainer (MPT) tour	Day 5	W.S.	2.0	A		5.f.
Operations track overview	Day 5	W.S.	1.0	A		1.a.
T.O. familiarization	Day 5	Maint Mgt	2.5		2b	1.d.

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: GLCM Maintenance Officer Course  
(Proposed)

WEAPON SYSTEM: Ground Launched Cruise Missile  
(GLCM)

COURSE NUMBER: TAC GLCM 3121C

TOTAL HOURS: 209

Course Training Standard: CTS TAC GLCM 3121C  
1 Sep 83 (Draft)

Course Outline: TAC GLCM 3121C  
1 Sep 83 (Draft)

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Power self study LCC power lecture Environmental support systems lecture Communications self study Communications lecture	Day 6	W.S.	1.0	B		2.c.,2.d.
	Day 6	W.S.	1.0	B		2.c.,2.d.
	Day 6	W.S.	1.0	B		2.d.
	Day 6	W.S.	2.0	B		2.e.
	Day 6	W.S.	2.0	B		2.e.
Weapons control system self study Operator display and entry Operational Display and Entry Panel (ODEP) lecture	Day 7	W.S.	1.0	A		2.d.
	Day 7	W.S.	2.5	A		2.d.
	Day 7	W.S.	1.0	A		2.d.
	Day 7	W.S.	1.0	A		2.d.
	Day 7	W.S.	1.0	A		2.d.
Training concepts MPT operations Weapon system operation MPT; launch sequence, weapon system faults, communications	Day 8	Other	0.5	A		2.8.
	Day 8	W.S.	0.5	A		5.f.
	Day 8	W.S.	3.0	A		5.f.
	Day 8	W.S.	2.0	A		5.f.
	Day 8	W.S.	2.0	A		5.f.
Legal/UCMJ/Basis for Authority COMSEC/OPSEC/PRP Self Study Msl/Nuclear Safety Self Study	Day 9	Maint Mgt	3.0	B		6.a.
	Day 9	Other	2.0	B		6.b.
	Day 9	Maint Mgt	2.0	B		6.b.
Maintenance Organization Structure and Function	Day 10	Maint Mgt	6.0	B		6.d.

MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: GLCM Maintenance Officer Course  
(Proposed)

WEAPON SYSTEM: Ground Launched Cruise Missile  
(GLCM)

COURSE NUMBER: TAC GLCM 3121C

TOTAL HOURS: 209

Course Training Standard: CTS TAC GLCM 3121C  
1 Sep 83 (Draft)

Course Outline: TAC GLCM 3121C  
1 Sep 83 (Draft)

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
USAFE 4109 Log Plan/USAFER 66-14	Day 11	Maint Mgt	6.5	B		1.b.
Publications/tech orders/field manuals	Day 12	Maint Mgt	7.0		2b	1.b.
Maintenance forms	Day 13	Maint Mgt	2.0	B		1.b.
Maintenance data collection/MMICS	Day 13	Maint Mgt	3.0	B		1.b.
GLCM Supply Systems	Day 13	Maint Mgt	1.0	B		1.b.
Verbal and written communications	Day 14	Maint Mgt	3.0	B		6.c.
Maintenance Management Practice	Day 14	Maint Mgt	3.0	B		6.d.
Management Laboratory (problems, case studies)	Day 15	Applic	6.0	B		6.d.
LCC and Environmental maintenance	Day 16	OBSERV/P	3.0	B		7.c.
TEL Power maintenance	Day 16	OBSERV/P	3.0	B		7.c.
AUR loading/Warhead loading	Day 17	OBSERV/P	4.0	B		7.c.
AUR receipt, preload certification	Day 17	OBSERV/P	1.5	B		7.d.
AUR emergency defuel	Day 17	OBSERV/P	1.0	B		7.d.
Electronics Self Study/review	Day 18	W.S.	2.0	B		7.b.
WCS LCC and Fiber Optics	Day 18	OBSERV/P	2.0	B		7.b.
WCS TEL	Day 18	OBSERV/P	2.0	B		7.b.
System Built-in-test (BIT)	Day 18	OBSERV/P	1.0	B		7.b.

# MISSILE MAINTENANCE OFFICER COURSE COMPARISON WORKSHEET

COURSE TITLE: GLCM Maintenance Officer Course  
(Proposed)

WEAPON SYSTEM: Ground Launched Cruise Missile  
(GLCM)

COURSE NUMBER: TAC GLCM 3121C

TOTAL HOURS: 209

Course Training Standard: CTS TAC GLCM 3121C  
1 Sep 83 (Draft)

Course Outline: TAC GLCM 3121C  
1 Sep 83 (Draft)

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Operation/Checkout of UHF, VHF, HF radios and field phone	Day 19	OBSERV/P	6.0	B		7.a.,2.e.
Vehicle maintenance--preventive maintenance vehicle maintenance	Day 20	OBSERV/P	1.5	B		7.f.
M.A.N. tractor training	Day 20	OBSERV/P	2.0	B		7.f.
K10 Blazer training	Day 20	OBSERV/P	2.0	B		7.f.
	Day 20	OBSERV/P	1.0	B		7.f.
Dispersal Training--description	Day 21	W.S.	1.0	B		4.a.
field maintenance	Day 21	Maint Mgt	2.5	B		1.a.
dispersal support	Day 21	Maint Mgt	1.5	B		1.a.
Field Dispersal--Observe maintenance and participate in field training	Day 22 to Day 25	OBSERV/P	72.0	B		7.h./4.a.
Graduation	Day 25					



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# APPENDIX

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## C

# AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

COURSE NUMBER: C30BR4021 002

TOTAL HOURS: 716

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block I:						
Orientation	1.a.	Other	8	N/A		None
Identify selected concepts employed in USAF maint policy	2.a.	Maint Mgt	4	A		1
Identify career progression steps for an A/C maint officer	2.b.	Maint Mgt	2	A		4.a.
Identify responsibilities of A/C maint officer	2.c.	Maint Mgt	2	A		4.a.
Select correct application of maint inspection concepts	3.a.	Maint Mgt	6	E		16
Identify procedures for use of admin publication	4.a.	Maint Mgt	5	B		3.a., 3.c.
Identify the types of technical orders	4.b.	Maint Mgt	3	B		3.b.
Identify the policies for management of technical orders	4.c.	Maint Mgt	9	B		3.b.
Given a maintenance problem, prepare the appropriate correspondence	5.a.	Applic W.S.	4		3c	2.b.
Identify major aircraft components	6.a.		3	B		17.a
Identify aerodynamic principles applicable to A/C structures	6.b.	W.S.	7	B		17.a.- 17.d.
Identify operational characteristics of A/C flight controls	6.c.	W.S.	8	B		17.a.- 17.d.
Identify management principles applicable to A/C weight & balance	6.d.	Maint Mgt	8	B		30

# AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

COURSE NUMBER: C30BR4021 002

TOTAL HOURS: 716

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block II:						
Identify statements about DC electricity	1.a.	W.S.	2	B		19.a.(1)
Identify operating characteristics of batteries	1.b.	W.S.	1	B		19.a.(1)
Determine correct values in DC circuits	1.c.	W.S.	4	B		19.a.(1)
Identify electrical meters	1.d.	W.S.	1	B		19.a.(1)
Describe specific current control devices	1.e.	W.S.	1	B		19.b.(4)
Identify factors which affect strength of electromagnets	1.f.	W.S.	1	A		19.a.(3)
Identify operating characteristics of DC motors	1.g.	W.S.	2	B		19.b.(3)
Identify operating characteristics of DC generators	1.h.	W.S.	2	B		19.b.(3)
Define AC electrical terms	2.a.	W.S.	2	B		19.a.(2)
Identify the effects of frequency on AC circuits	2.b.	W.S.	2	B		19.a.(2)
Identify characteristics of transformers	2.c.	W.S.	2	B		19.b.(1)
Identify characteristics of AC generators	2.d.	W.S.	2	B		19.a.(2)
Identify characteristics of induction motors	2.e.	W.S.	1	B		19.b.(3)
Given an A/C T.O., identify statements which correctly describe the units in the system	2.f.	W.S.	2	B		19.b.(3)
Identify relationship of electronics to forms of intelligence	3.a.	W.S.	1	B		20.c.

# AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

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POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block II: (Continued)						
Identify safety precautions associated with electronic equipment	3.b.	Maint Mgt	1	B		10
Identify function of power supply component	4.a.	W.S.	2	B		19.b.(2)
Identify amplifier circuitry	5.a.	W.S.	1	B		20.a.
Identify operating characteristics of oscillators	5.b.	W.S.	1	B		20.b.
Identify functions of AM transmitter components	6.a.	W.S.	2	B		20.b.
Identify functions of AM receiver components	6.b.	W.S.	2	B		20.c.,
Identify operating characteristics of antenna systems	6.c.	W.S.	1	B		21.a.
Identify operating characteristics of A/C comm system units	6.d.	W.S.	1	B		20.c.,
Given a maintenance management situation, demonstrate proper communication techniques	7.a.	Applic	8		3c	21.a.
Identify selected applications of computers	8.a.	W.S.	1	B		2.b.
Identify principles of operation of laser systems	9.a.	W.S.	3	B		20.e.
Identify operating characteristics of flight instruments	10.a.	W.S.	10	B		21.a.,
						21.c.,
						21.d.
						21.b.

# AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

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TOTAL HOURS: 716

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block II: (Continued)						
Identify operating characteristics of a Central Air Data Computer	10.b.	W.S.	2	B		21.b.
Identify navigation terms	11.a.	W.S.	1	B		21.a.
Identify operating characteristics of a ground based navigation system	11.b.	W.S.	3	B		21.a.
Identify operating characteristics of navigation instruments	11.c.	W.S.	2	B		21.a.
Identify operating characteristics of an IFF/SIF system	11.d.	W.S.	1	B		21.a.
Identify operating characteristics of an airborne pulse radar system	12.a.	W.S.	4	B		21.a., 21.c.
Block III:						
Identify the organization of Maintenance Control	1.a.	Maint Mgt	1	C		9.a.
Distinguish the functions of Maintenance Staff Agencies	1.b.	Maint Mgt	13	C		9.a.
Identify the difference in maintenance control function between an AFR 66-1 and AFR 66-5 organization	1.c.	Maint Mgt	2	C		9.a.
Identify coordination requirements of Maintenance Staff Agencies in controlling maintenance	1.d.	Maint Mgt	10	C		9.a.

AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

COURSE NUMBER: C30BR4021 002

TOTAL HOURS: 716

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: (Continued)						
Identify the responsibilities of Quality Control	1.e.	Maint Mgt	4	B		9.c.
Identify admin requirements of Maintenance Standardization and Evaluation Program (MSEP)	1.f.	Maint Mgt	3	B		9.c.
Identify difference between QC and QA functions	1.g.	Maint Mgt	1	B		9.c.
Identify responsibilities of management support agencies	1.h.	Maint Mgt	3	B		9.b.
Determine appropriate MICAP status codes	1.i.	Maint Mgt	1	C		9.a.
Describe responsibilities of production unit maint mgrs (AFM 66-1)	2.a.	Maint Mgt	11	B		7.a.-
Describe organization of maintenance production units (66-1)	2.b.	Maint Mgt	4	B		7.e.
Describe responsibilities of production unit maint mgrs (AFR 66-5)	2.c.	Maint Mgt	6	B		7.f.-
Describe organization of maintenance production units (66-5)	2.d.	Maint Mgt	4	B		7.h.
Identify key features of dual channel training concept	2.e.	Maint Mgt	2	B		7.f.-
Describe organization of Depot Level Maintenance	2.f.	Maint Mgt	2	B		7.h.
Identify terms, definitions, classification as they relate to COMSEC	3.a.	Other	0.5	B		9.b.
						7.i.
						11.a.(1)
						11.a.(2)

# AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

COURSE NUMBER: C30BR4021 002

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

TOTAL HOURS: 716

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block III: Identify corrective actions as they relate to COMSEC Identify common OPSEC vulnerabilities peculiar to AFSC 4021 Demonstrate proper comm techniques given a maintenance problem	3.b. 3.c. 4.a.	Other Other Applic	0.5 1 2	B A		11.a.(3), 11.a.(4) 11.b.(6) 2.b.
Block IV: Identify concepts associated with the definition of management Identify working relationships common to most maint officers in their initial management positions Identify characteristics of selected management techniques Identify principles of morale Identify principles of discipline Identify principles of punishment Identify principles of human relations Develop and present a military briefing	1.a. 1.b. 1.c. 1.d. 1.e. 1.f. 1.g. 2.a.	Applic Applic Applic Applic Applic Applic Applic Applic	6 20 15 1 1 1 1 8		2b 2b 2b 2b 2b 2b 3c 3c	13 13 13 13 13 2.a., 2.b. 2.b.
Prepare a Letter of Appreciation Identify responsibilities of A/C maint officer with respect to additional duties Identify proper MMICS procedures	3.a. 4.a. 5.a.	Applic Maint Mgt Maint Mgt	3 8 8	A B		2.a.,12 6

AIRCRAFT MAINTENANCE OFFICER COURSE WORKSHEET

COURSE TITLE: Aircraft Maintenance Officer

COURSE NUMBER: C30BR4021 002

TOTAL HOURS: 716

Course Training Standard: CTS C30BR4021 002 30 October 1978

POI: C30BR4021 2 February 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block V:						
Identify the purpose of AFTO Form 349 or 350	1.a.	Maint Mgt	1	B		5.a.
Identify purpose of MDC categories	1.b.	Maint Mgt	1	B		5.a.
Identify proper documentation for selected maintenance actions	1.c.	Maint Mgt	14	B		5.a.
Identify operating characteristics of auto flight control system	2.a.	W.S.	4	B		21.b.
Identify ops characteristics of auto navigation system	3.a.	W.S.	6	B		21.a.
Identify ops characteristics of a navigation computer	3.b.	W.S.	2	B		21.a.
Identify ops characteristics of a weapons control system	4.a.	W.S.	5	B		21.c.
Identify ops characteristics of a bombing computer	4.b.	W.S.	2	B		21.c.
Identify ops characteristics of bomb-navigation system	4.c.	W.S.	1	B		21.c.
Identify purpose of selected 781 series equipment status forms	5.a.	Maint Mgt	1	B		5.a.
Identify the meaning of status symbols	5.b.	Maint Mgt	1	B		5.a.
Document maintenance events in AFTO 781 series forms	5.c.	Applic	16	B		5.a.
Identify proper support equipment forms documentation	5.d.	Maint Mgt	1	B		5.a.



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				KNOWL	SKILL	
Block V: (Continued)						
Identify characteristics of various sensor systems	6.a.	W.S.	2	B		21.d.
Identify application of various sensor systems	6.b.	W.S.	2	B		21.d.
Identify terms relating to electronic countermeasures	7.a.	W.S.	4	B		21.d.
Identify selected concepts in maintenance of avionics AGE	8.a.	W.S.	1	B		21.e.,
Identify capabilities of avionics AGE	8.b.	W.S.	1	B		21.f.
Demonstrate proper communications techniques (Airman's Medal)	9.a.	Applic	2		3c	21.e.
Identify ops characteristics of aircrew training devices	10.a.	W.S.	4	B		2.b.
Block VI:						32
Identify ops principles of subassemblies of gas turbine engines	1.a.	W.S.	8	B		18.a.
Identify propulsion theory principles in gas turbine engines	1.b.	W.S.	3	B		18.a.
Identify ops principles of gas turbine system components	1.c.	W.S.	7	B		18.a.
Identify A/C maint mgr responsibilities to FOD program	1.d.	Maint Mgt	2	B		18.b.

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				KNOWL	SKILL	
Block VI: (Continued)						
Identify A/C maint mgr responsibilities in oil analysis program	1.e.	Maint Mgt	2	B		18.b.
Identify objectives of propulsion management system	2.a.	Maint Mgt	1	B		18.b.
Identify responsibilities of different functions in propulsion mgt system	2.b.	Maint Mgt	3	B		18.b.
Identify purpose of selected historical forms	3.a.	Maint Mgt	1	B		5.a.
Identify functions of pneudraulic system components	4.a.	W.S.	5	B		25
Identify characteristics of pneudraulics system fluids	4.b.	W.S.	1	B		25
Identify proper safety procedures concerning pneudraulic system	4.c.	Maint Mgt	1	B		25
Identify ops characteristics of a pneudraulic system	4.d.	W.S.	3	B		25
Identify characteristics of aviation fuels	5.a.	W.S.	2	B		24
Identify functions of fuel system components	5.b.	W.S.	3	B		24
Identify proper safety precautions when maintaining A/C fuel systems	5.c.	W.S.	2	B		24
Identify functions of A/C environmental system components	6.a.	W.S.	6	B		22.b., 22.c.
Identify functions of ice prevention/elimination systems	6.b.	W.S.	2	B		27

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				KNOWL	SKILL	
Block VI: (Continued)						
Identify functions of A/C fire indicating and extinguisher systems	6.c.	W.S.	2	B		26
Demonstrate proper communications techniques (briefa/c systems)	7.a.	Applic	3		3c	2.b.
Correctly document maintenance events on AFTO 781	8.a.	Applic	8	B		5.b.
Select appropriate NDI technique to verify A/C structural defects	9.a.	W.S.	2	B		28.c.
Identify appropriate airframe repairs	9.b.	W.S.	2	B		28.d.
Identify appropriate corrosion mgt principles	9.c.	Maint Mgt	2	B		29.a., 29.b., 29.c.
Identify correct statements about A/C material stresses	9.d.	W.S.	1	B		28.a., 28.b.
Block VII:						
Deliver a 10-minute military briefing on a maintenance subject	1.a.	Maint Mgt	11		3c	2.a.
Identify individual responsibilities in USAF Ground Safety Program	2.a.	Maint Mgt	2	B		10
Identify unsafe conditions found in A/C maintenance activities	2.b.	Maint Mgt	2	B		10
Prepare report of corrective actions to safety program violation	2.c.	Applic	3		3c	2.b.,10

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				KNOWL	SKILL	
Block VII: (Continued)						
Identify safety requirements for operating motor vehicles	2.d.	Maint Mgt	3	B		10
Identify maint officers responsibility as unit safety rep	2.e.	Maint Mgt	1	A		12
Identify ops characteristics of selected pieces of powered AGE	3.a.	W.S.	1	B		31.b.
Identify ops characteristics of non powered AGE	3.b.	W.S.	1	B		31.a.
Identify methods employed in counseling situations	4.a.	Maint Mgt	3	B		2.c.
Identify counseling approaches	4.b.	Maint Mgt	5	B		2.c.
Identify referral agencies	4.c.	Maint Mgt	4	B		2.c.
Identify purpose of IG inspections	5.a.	Maint Mgt	2	B		14
Identify scope of modification program	6.a.	Maint Mgt	2	B		9.c.
Identify general policies of modification program	6.b.	Maint Mgt	1	B		9.c.
Distinguish characteristics of modification classes	6.c.	Maint Mgt	1	B		9.c.
Identify function of selected egress system components	7.a.	W.S.	6	B		23
Identify safety requirements while performing maint on egress system components	7.b.	Maint Mgt	2	B		23
Identify purpose of flight mishap safety investigations	8.a.	Maint Mgt	1	B		15

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				KNOWL	SKILL	
Block VII: (Continued)						
Determine how to classify a mishap	8.b.	Maint Mgt	2	B		15
Identify levels of flight mishap investigations	8.c.	Maint Mgt	0.5	B		15
Identify types of investigation boards	8.d.	Maint Mgt	0.5	B		15
Identify responsibilities of selected personnel during a flight mishap investigation	8.e.	Maint Mgt	3	B		15
Identify reports required during flight mishap investigation	8.f.	Maint Mgt	2	B		15
Document maint events on AFTO 781 series forms	9.a.	Applic	10		3c	5.b.
Block VIII:						
Identify AF Logistics Concepts	1.a.	Maint Mgt	4	B		8.a.
Identify statements concerning Resource Management System	2.a.	Maint Mgt	4	B		6
Determine an organization's financial status given RMS reports	2.b.	Maint Mgt	4	B		6
Identify management procedures of USAF Supply System	3.a.	Maint Mgt	4	B		8.b.
Identify aspects of supply priority system	3.b.	Maint Mgt	4	B		8.b.
Distinguish between supply and maint responsibilities concerning stock control	3.c.	Maint Mgt	8	B		8.b.

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CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block VIII: (Continued)						
Given supply mgt responsibility, select retail/wholesale supply function to which it would be assigned	3.d.	Maint Mgt	4	B		8.a.
Identify correct statements concerning mgt of public property	3.e.	Maint Mgt	4	B		8.b.
Select appropriate mgt actions in supply support scenario	3.f.	Maint Mgt	14	B		8.b.
Identify impact of investment and expense material on RMS	3.g.	Maint Mgt	4	B		8.b.
Given selected supply reports, select correct statements regarding supply transactions	3.h.	Maint Mgt	6	B		8.b.
Correctly document maint actions on AFTO Forms 781	4.a.	Applic	5		3c	5.b.
Given a maint mgt situation, demonstrate proper communications techniques	5.a.	Applic	6		3c	2.b.
Block IX:						
Identify correct statements concerning MDC systems	1.a.	Maint Mgt	18	B		6
Correctly identify required MDC data given a maint situation	1.b.	Maint Mgt	5	B		6
Identify methods used in establishing manpower authorizations standards for maint activities	2.a.	Maint Mgt	5	B		4.d.

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				KNOWL	SKILL	
Block IX: (Continued)						
Identify management uses of manpower authorization documents	2.b.	Maint Mgt	3	B		4.d.
Identify concepts of the military personnel classification systems	2.c.	Maint Mgt	4	A		4.a., 4.b.
Identify responsibilities of the different functional levels of personnel mgt	2.d.	Maint Mgt	3	A		4.a., 4.b.
Given a situation, select the correct method to be used in the evaluation of military personnel	2.e.	Maint Mgt	6	A		4.a., 4.b.
Identify individual responsibilities of enlisted members	2.f.	Maint Mgt	1	A		4.b.
Identify individual responsibilities of the officer force	2.g.	Maint Mgt	1	A		4.a.
Identify admin procedures pertaining to AF civilian employees	3.a.	Maint Mgt	5	A		4.c.
Identify the responsibilities of mgt and employees	3.b.	Maint Mgt	3	A		4.c.
Select two correct methods to evaluate civilian personnel	3.c.	Maint Mgt	2	A		4.c.
Correctly document maint on AFTO Forms 781	4.a.	Applic	10		3c	5.b.
Given a maint mgt situation, demonstrate proper communications techniques	5.a.	Applic	6		3c	2.b.

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				KNOWL	SKILL	
Block X: Construct an aircraft utilization schedule Develop a weekly aircraft utilization schedule Construct an EWO generation plan Given a backlog of correspondence that could accumulate in the maint complex, identify the problems and recommend mgt decisions (In-Basket Problem) Given a control room simulator and maint activity simulator, demonstrate ability to make mgt decisions to effectively accomplish the flying schedule Identify purpose and procedures of USAF Graduate Evaluation Program	1.a.	Applic	16		2b	13
	2.a.	Applic	8		2b	13
	3.a.	Applic	3		2b	13
	4.a.	Applic	11		2b	13
	5.a.	Applic	38		2b	13
	6.a.	Other	1		a	33



# AIRCRAFT MAINTENANCE OFFICER COURSE SHEET

COURSE TITLE: Aircraft Maintenance Officer, Accelerated

COURSE NUMBER: C30BR4021 001

Course Training Standard: CTS C30BR4021 001 21 December 1981 POI: C30BR4021 11 January 1982

CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
<p>Block I:</p> <p>Orientation</p> <p>Develop an organizational chart explaining the relationship between staff, command, and production functions</p> <p>Develop an organization chart to include each work center's name, number and relationship</p> <p>Establish appropriate relationship between the standards for AF manpower authorization and each unit's manpower authorizations</p> <p>Establish relationship between manpower authorization document and organizational levels</p> <p>Establish relationship between military personnel mgt guidelines and a healthy military workforce attitude to include classification system concepts and skill level-rank relationships</p> <p>Identify relationship between civilian personnel mgt guidelines and healthy military-civilian workforce attitude</p> <p>Determine relationship between unit training mgt function and other maint agencies</p>	1.a.	Other	2	N/A		None
	2.a.	Maint Mgt	2	B		1.b., 3.a.
	2.b.	Maint Mgt	10	B		2.a.- 2.g.
	3.a.	Maint Mgt	1	B		1.a.
	3.b.	Maint Mgt	1	B		1.a.
	3.c.	Maint Mgt	3	B		1.a.
	3.d.	Maint Mgt	2	B		1.a.
	3.e.	Maint Mgt	1	B		1.a.

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COURSE NUMBER: C30BR4021 001

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CONDENSED LEARNING OBJECTIVE OR TOPIC AREA	POI/SYLLABUS REFERENCE	BASIC CATEGORY	NUMBER OF HOURS	LEVEL OF TRAINING		CTS REF
				KNOWL	SKILL	
Block I: (Continued)						
Establish relationship between QC and other maintenance agencies	4.a.	Maint Mgt	8	C		3.c.
Apply principles of proper documentation of typical maintenance actions	5.a.	Maint Mgt	10	B		1.c.
Determine proper accountable procedures for aircraft and missile equipment	5.b.	Maint Mgt	2	B		1.c.
Determine relationship of AF Standard Publication System and a well managed staff/production unit	6.a.	Maint Mgt	2	B		6.a.
Determine the appropriate relationship of the Air Force T.O. system and a well-managed staff/production unit	6.b.	Maint Mgt	2	B		6.b.
Determine the relationship of the admin function to other staff and production functions	7.a.	Maint Mgt	2	B		3.d.
Determine the relationship of the documentation function to other staff and production functions	7.b.	Maint Mgt	2	B		3.b.
Relate the preventive maintenance program to mission capability	8.a.	Maint Mgt	4	B		1.b.
Relate the AF Corrosion Control Program to future aircraft capability	8.b.	Maint Mgt	2	B		1.b.
Relate the application of NDI to improved A/C capability	8.c.	Maint Mgt	2	B		1.b.

# AIRCRAFT MAINTENANCE OFFICER COURSE SHFET

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<p>Block I: (Continued)</p> <p>Establish relationship between an active safety program and a unit's capability</p> <p>Determine role of an A/C maint mgr and an A/C mishap investigation function</p> <p>Determine the relationship between the programs and mobility function and other intra and inter organizational functions</p> <p>Analyze financial mgt techniques employed to manage a unit's mission accomplishments</p> <p>Determine the relationship between the supply system responsiveness to organizational/mission needs and a unit's ability to accomplish its mission</p> <p>Correctly document on- and off-equipment maint actions and historical data on AFTO Forms 349 and 350</p> <p>Given MDC System Reports, analyze data and determine where management actions could improve a unit's capabilities</p>	9.a.	Maint Mgt	2	B		7.a.
	9.b.	Maint Mgt	2	B		7.b.
	10.a.	Maint Mgt	2	B		3.d.
	10.b.	Maint Mgt	2	C		5.b.
	11.a.	Maint Mgt	24	B		5.a.
	12.a.	Applic	6	C		3.d., 4.a.
	12.b.	Maint Mgt	13	C		3.d., 4.b.

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				KNOWL	SKILL	
Block I: (Continued)						
Analyze data from the Aerospace Vehicle Inventory, Status and Utilization reporting system to determine where mgt actions could improve unit capability	12.c.	Maint Mgt	3	C		3.d., 4.a., 4.c.
Analyze MMICS products to determine areas where mgt actions could improve unit capability	13.a.	Maint Mgt	8	C		4.a.
Determine relationship between AFR 66-1 and 66-5 POMO and non POMO functions including plans and scheduling	14.a.	Maint Mgt	1	C		3.b.
Project maint capability for one month	14.b.	Applic	3	C		3.b.
Develop an equipment utilization and maint schedule for one month	14.c.	Applic	8	C		3.b.
Develop a weekly A/C utilization and maint schedule	14.d.	Applic	4	C		3.b.
Apply AFR 66-1 or 66-5 principles to maintain proper relationship between job control and production units	15.a.	Applic	5	C		3.b.
Using a maint scenario, make correct maint control officer decisions	15.b.	Applic	16	B		3.a.
Identify purpose of USAF Graduate Evaluation Program	16.a.	Other	0.5		a	8
Identify OPSEC vulnerabilities peculiar to 4021 AFSC	16.b.	Other	0.5	A		9